

**FINAL SITE-SPECIFIC HEALTH AND SAFETY PLAN**  
**FOR THE**  
**PHASE I RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION**  
**OPERABLE UNIT 6**

April 1992



ADMIN RECORD

A-0006-000046

REVIEWED FOR CLASSIFICATION/UCM  
By [Signature]  
Date 7/7/92



## INTEROFFICE CORRESPONDENCE

DATE: June 22, 1992  
TO: D. M. Smith, Environmental Management, Bldg. 080, X8636  
FROM: J. S. Van Meighem, Industrial Hygiene, Bldg. T452F, X5810  
SUBJECT: APPROVAL OF FINAL SITE-SPECIFIC HEALTH AND SAFETY PLAN (SSHSP) - JSV-041-92

The final SSHSP for Resource Conservation Recovery Act (RCRA) Facility Investigation/Remedial Investigation at Operable Unit 6 has been approved by Health and Safety. Five copies of the final plan and approval signatures are enclosed with this letter.

In addition, a computer disk copy of the plan is included to facilitate any future changes to this plan. Additional changes to the plan must be approved by the Health and Safety Liaison Officer prior to implementation.

Distributed copies of this plan should be controlled to ensure implemented changes are distributed to the responsible custodians.

If you have any questions, please feel free to call me at Extension 5810.

vg

Enclosures:  
As Stated

cc:

S. A. DeWitt - w/Enc.

P. Laurin - w/out Enc.

M. J. Richen - w/out Enc. *WJ*

ADMIN RECORD

HEALTH AND SAFETY PLAN

Health and Safety Plan for RCRA Facility Investigation / Remedial Investigation at Operable Unit 6

REVIEW AND APPROVAL



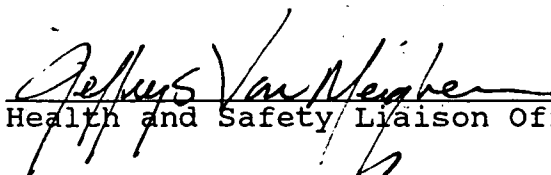
Director of Environmental Management

  
Date



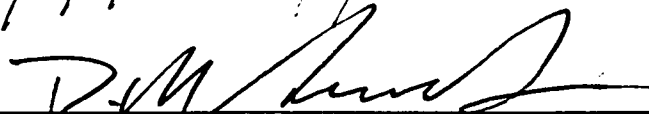
Manager of Safety and Hygiene

6/18/92  
Date



Health and Safety Liaison Officer

6.18.92  
Date



Health and Safety Environmental  
Management Officer

1 July 92  
Date


## HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Health and Safety Plan for the Phase I RCRA Facility Investigation/  
Remedial Investigation at Operable Unit 6.

Subcontractor Document YES  
EG&G Document NO

  
\_\_\_\_\_  
Fire Protection

3/30/92  
\_\_\_\_\_  
Date

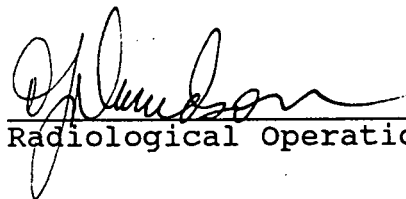
SITE SPECIFIC HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Site Specific Health and Safety Plan and agree that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

DRAFT HEALTH AND SAFETY PLAN FOR THE PHASE I RCRA FACILITY INVESTIGATION /REMEDIAL INVESTIGATION AT OPERABLE UNIT 6

Subcontractor Document NO  
EG&G Document YES

  
Radiological Operations

5/14/92  
Date


SITE SPECIFIC HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Site Specific Health and Safety Plan and agree that requirements which are managed by this division have been addressed in a technically correct manner.

Site Specific Health and Safety Plan Title:

Health and Safety Plan for RCRA Facility Investigation/Remedial Investigation at Operable Unit 6, prepared by EBASCO

Subcontractor Document YES  
EG&G Document NO

  
Industrial Hygiene

92-4-9  
Date

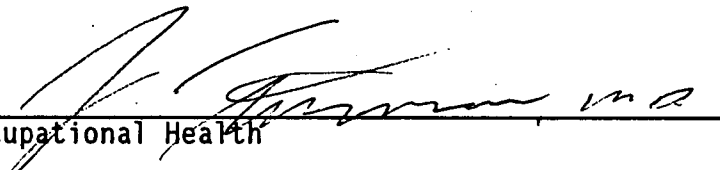
## HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Health and Safety Plan for the Phase I RCRA Facility Investigation/  
Remedial Investigation at Operable Unit 6.

Subcontractor Document YES  
EG&G Document NO

  
Occupational Health

3/30/92  
Date

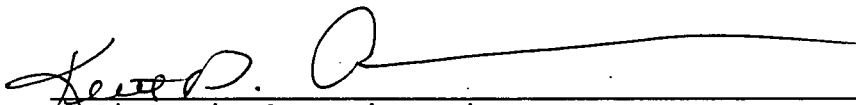
SITE SPECIFIC HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Site Specific Health and Safety Plan and agree that requirements which are managed by this division have been addressed in a technically correct manner.

Site Specific Health and Safety Plan Title:

FINAL SITE SPECIFIC HEALTH AND SAFETY PLAN FOR THE PHASE I RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION AT OPERABLE UNIT 6, prepared by EBASCO Services, Incorporated

Subcontractor Document NO  
EG&G Document YES

  
Radiological Engineering

4/29/92  
Date



## HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Health and Safety Plan for the Phase I RCRA Facility Investigation/  
Remedial Investigation at Operable Unit 6.

Subcontractor Document YES  
EG&G Document NO

  
Industrial Safety



4/30/92  
Date  
5/4/92

SITE SPECIFIC HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Site Specific Health and Safety Plan and agree that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

DRAFT HEALTH AND SAFETY PLAN FOR THE PHASE I RCRA FACILITY INVESTIGATION /REMEDIAL INVESTIGATION AT OPERABLE UNIT 6

Subcontractor Document NO  
EG&G Document YES

  
Health and Safety Area Coordinator

  
Date

**FINAL SITE-SPECIFIC HEALTH AND SAFETY PLAN**  
**FOR THE**  
**PHASE I RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION**  
**OPERABLE UNIT 6**

April 1992



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## **1.0 INTRODUCTION**

### **1.1 POLICY**

EG&G Rocky Flats, Inc. (EG&G), in conjunction with the U.S. Department of Energy (DOE), has adopted the Federal Occupational Safety and Health Administration (OSHA) standard, Title 29, Code of Federal Regulations (CFR) 1910.120 for hazardous waste site workers at the Rocky Flats Plant (RFP). This site-specific Health and Safety Plan (SSHSP) addresses the requirements of this standard for EG&G personnel managing and monitoring activities at Operable Unit 6 (OU6) and provides information and guidance for environmental contractors and subcontractors (subcontractors) when writing their own SSHSP. The intent of the SSHSP is to protect EG&G personnel and to provide guidance for conducting OU6 activities in a manner that best serves the health and safety of workers, visitors, and the surrounding population.

EG&G personnel will follow this SSHSP and RFP procedures and policies when conducting work at OU6 sites. In addition, subcontractors are required to develop and implement their own SSHSP for subcontractor site activities. The subcontractor SSHSP will comply with procedures contained in this SSHSP. Subcontractors will follow Rocky Flats Plant Procedures and Policies when applicable to site operations.

### **1.2 REGULATIONS AND GUIDELINES**

Adherence to applicable federal, local, and national consensus organization health and safety standards, regulations, and guidance manuals is required during field activities at OU6. These include, but may not be limited to, the following:

- 29 CFR 1910, Occupational Safety and Health Standards, General Industry (latest edition)
- 29 CFR 1926, Occupational Safety and Health Standards, Construction Industry (latest edition)
- Nuclear Regulatory Commission 10 CFR 20 (latest edition)
- DOE Order 5480.11 (with revisions)
- Health and Safety Practices Manual (HSPM), EG&G Rocky Flats, Inc. (with revisions)

- Radiological Operating Instructions (ROI), EG&G Rocky Flats, Inc. (with revisions)
- Environmental Management Radiological Guidelines (EMRG), EG&G Rocky Flats, Inc. (with revisions)
- Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists (latest edition)
- Occupational Safety and Health Guidance for Hazardous Waste Site Activities, U.S. Department of Health and Human Services et al., October 1985.

### 1.3 CONTENTS OF PLAN

This SSHSP describes known hazardous materials and work operations associated with the Resource Conservation and Recovery Act (RCRA) investigation activities at OU6. The plan specifies responsibilities and authorities of EG&G personnel involved in the supervision of activities at this site. This plan further describes the requirements for medical surveillance, personal protective equipment (PPE), hazard communication, training, monitoring, decontamination, site control, new technology program, and emergency response procedures.

The potential hazards associated with Phase I RCRA Facility Investigation/Remedial Investigation (RFI/RI) activities at OU6 sites have been assessed by reviewing historical activities and previously performed studies at the Individual Hazardous Substance Sites (IHSS) within OU6. Based on the hazard assessment, plans for personal protective equipment, monitoring, decontamination, site control, and emergency response have been developed.

### 1.4 BACKGROUND

A comprehensive, phased program of site characterization, remedial investigations, feasibility studies, and remedial/corrective actions is in progress at RFP. These investigations are being conducted pursuant to the 1986 Compliance Agreement between DOE, the U.S. Environmental Protection Agency (EPA), and the Colorado Department of Health (CDH), which addresses

hazardous and radioactive mixed waste management at the plant. The Phase I RFI/RI at OU6 is part of the remedial investigation phase of this program.

The following 21 IHSS have been grouped into OU6:

- A-Series Ponds A-1, A-2, A-3, A-4, A-5 (IHSS 142.1, 142.2, 142.3, 142.4, and 142.12)
- B-Series Ponds B-1, B-2, B-3, B-4, and B-5 (IHSS 142.5, 142.6, 142.7, 142.8, and 142.9)
- North, South, and Pond Area Spray Fields (IHSS 167.1, 167.2, and 167.3)
- East Area Spray Field (IHSS 216.1)
- Trenches A, B, and C (IHSS 166.1, 166.2, 166.3)
- Sludge Dispersal Area (IHSS 141)
- Triangle Area (IHSS 165)
- Old Outfall (IHSS 143)
- Soil Dump Area (IHSS 156.2).

## 1.5 LOCATIONS AND DESCRIPTIONS

The 21 IHSS are geographically located along or within the drainage areas of North and South Walnut creeks. Appendix A contains location maps of OU6 and each IHSS from the OU6 Phase I RFI/RI Work Plan (EG&G, 1991). These IHSS are identified in the Environmental Restoration Interagency Agreement (IAG), dated January 22, 1991. Ten of these IHSS are detention ponds and include the A-Series and B-Series Ponds. The A-Series Ponds, located on North Walnut Creek, are Ponds A-1, A-2, A-3, and A-4 (IHSS 142.1 through 142.4), and the pond identified as Pond A-5, which will be referred to as the pond east of the confluence of North and South Walnut creeks and/or as IHSS 142.12. The B-Series Ponds, located on South Walnut Creek are Ponds B-1, B-2, B-3, B-4, and B-5 (IHSS 142.5 through 142.9). The remaining ten IHSS in OU6 are located on the banks and/or plateau areas which ultimately drain into North or South Walnut creeks or the unnamed tributary of North Walnut Creek. Four of

these IHSS are spray fields and are the North, Pond, South, and the East Area Spray Fields (IHSS 167.1, 167.2, 167.3, and 216.1). Three trenches are designated as Trenches A, B, and C (IHSS 166.1, 166.2, and 166.3). The remaining three IHSS are the Sludge Dispersal Area (IHSS 141), the Triangle Area (IHSS 165), and the Old Outfall (IHSS 143). In addition to these 20 IHSS, the Soil Dump Area (IHSS 156.2) has also been added to the Phase I OU6 investigation because of its location along the Walnut Creek drainage.

1.5.1 A-Series Ponds A-1, A-2, A-3, A-4, and A-5 (IHSS 142.1, 142.2, 142.3, 142.4, and 142.12)

Ponds A-1, A-2, A-3, and A-4 (IHSS 142.1 through 142.4) in North Walnut Creek are located northeast of the main security area of the RFP. Pond A-5 (IHSS 142.12) is located approximately 2,500 feet east of the confluence of North and South Walnut creeks and immediately west (upstream) of Indiana Street. The size of these ponds vary seasonally but are usually maintained at 10 percent capacity. The estimated storage capacity for Ponds A-1, A-2, A-3, and A-4 are 1,660,000; 6,700,000; 14,110,000; and 3,090,000 gallons, respectively. These ponds were generally constructed by the placement of an earthen embankment across the North Walnut Creek drainage. Outlets and spillways were constructed in some of the ponds. Outlets are used to regulate downstream flow from the ponds with spillways used to channel excess water around the embankment when the ponds are near their full capacity.

Between 1952 and 1979, Pond A-1 was used to hold laundry wastewater that contained nitrates and radioactive substances, including plutonium and uranium, that was discharged into North Walnut Creek from the northern production facilities. Pond A-1 also received process liquid waste, cooling tower blowdown and steam condensate discharges that contained chromates and algicides. These discharges, although long since discontinued, resulted in plutonium contamination of the stream sediments in North Walnut Creek and in the sediments of Pond A-1. Pond A-1 is presently used for spill control management and receives only local surface runoff and seepage that may occur in the area.

Pond A-2 received process wastewater and laundry wastewater from Ponds A-1 and B-2 (IHSS 142.6). The water from Pond B-2 was pumped to Pond A-2. Pond A-2 is presently used for spill control management like Pond A-1, and receives only local surface runoff and seepage that may occur near this area.

Presently, Pond A-3 collects surface runoff from the northern production facilities and North Walnut Creek as water originating upstream in North Walnut Creek are diverted around Ponds A-1 and A-2 by the A-1 Bypass and channelled into Pond A-3. The water is temporarily detained in Pond A-3 before being released into Pond A-4. Pond A-5 (IHSS 142.12) is used to take flow measurements of Walnut Creek.

#### 1.5.2 B-Series Ponds B-1, B-2, B-3, B-4, and B-5 (IHSS 142.5, 142.6, 142.7, 142.8, and 142.9)

Ponds B-1, B-2, B-3, B-4, and B-5 (IHSS 142.5 through 142.9) are built in South Walnut Creek, east of the eastern perimeter of the security area of the plant. The estimated capacity for Ponds B-1 through B-5 are 795,000; 1,930,000; 620,000; 600,000, and 23,140,000 gallons, respectively. The B-Series Ponds were generally constructed by the placement of an earthen embankment across South Walnut Creek. Outlet structures and spillways were built in some of the ponds to regulate flow out of these detention ponds and to channel excess water around the embankments when the ponds are near their full capacity.

The B-Series Ponds are used primarily to capture and control surface water runoff from the eastern and central portions of the RFP production facilities. Several waste disposal activities have been associated with the B-Series Ponds since the beginning of the plant operations in 1952. Between 1952, and 1973, decontaminated process water and laundry wastewater were released into South Walnut Creek and subsequently into the B-Series Ponds (Ponds B-1 through B-4). Nitrate, plutonium, and uranium were present in these wastes; however, the volume of wastes released into South Walnut Creek is unknown. Ponds B-1 and B-4 also received sanitary effluent from the Sewage Treatment Plant (Building 995).

Pond B-5 was constructed after 1979 and was used as an overflow pond for Pond B-4. In 1991, a diversion pipeline structure was built from Pond C-2 to Pond B-5 and periodically water is pumped from Pond C-2 into Pond B-5. Presently, Pond B-5 receives water from Pond B-4, surface runoff from the Central Avenue Ditch, and water from Pond C-2. The water is detained in Pond B-5 and then pumped to Pond A-4, where it is treated by a granular activated carbon system prior to being discharged downstream into Walnut Creek.

#### 1.5.3 North, South, and Pond Area Spray Fields (IHSS 167.1, 167.2, and 167.3)

IHSS 167.1, 167.2, and 167.3 are located north of the security area of the plant and north of North Walnut Creek. The North and South Area Spray Fields (IHSS 167.1 and 167.3), which occupy approximately 172,500 and 40,000 square feet, respectively, are partially located on the plateau areas that bound the unnamed tributary on North Walnut Creek. The Pond Area Spray Field (IHSS 167.2) occupies approximately 31,250 sq ft and is located on a north-facing slope leading into the present-day Landfill Pond. These spray fields are presently covered by grasses common to the RFP area.

These fields were used solely for the purpose of spraying water over the ground surface to enhance evaporation of the water. The water sprayed over these spray fields was obtained from two ponds located west of the Present Landfill (IHSS 114). These two ponds, referred to as the East Landfill Pond (the existing landfill pond) and the West Landfill Pond (no longer present), were used to intercept groundwater that may have been contaminated by leachate generated at the landfill, and to impound leachate generated by the landfill, respectively.

#### 1.5.4 East Area Spray Field (IHSS 216.1)

The East Area Spray Field (IHSS 216.1) is located within the buffer zone, northeast of the northeastern boundary of the security area of the plant facility. It is geographically on an east-west trending interfluvium that separates North and South Walnut creeks in the vicinity of the A-Series and B-Series Detention Ponds. This IHSS covers an area of approximately 150,000 sq ft.



This spray field became operational in 1989 to provide an additional area to accommodate the spray evaporation of water in Pond B-3. The water in Pond B-3 is from the effluent of the Sewage Treatment Plant and local surface runoff. The use of this area as a spray field stopped shortly after it became operational in the latter part of 1989 due to excessive runoff problems.

#### 1.5.5 Trenches A, B, and C (IHSS 166.1, 166.2, and 166.3)

IHSS 166.1, 166.2, and 166.3 are located north of the RFP security area on a plateau that separates North Walnut Creek and the unnamed tributary to the north. IHSS 166.1 (Trench A) is estimated to have dimensions of approximately 40 x 190 ft and is located about 100 ft southeast of the present landfill. IHSS 166.2 (Trench B) is also estimated to be a 40 x 190 ft trench that is approximately 125 ft south of IHSS 166.1. IHSS 166.3 (Trench C) consists of two separate trenches. The first trench is located between IHSS 166.1 and IHSS 166.2 and is approximately 30 x 200 ft. The second trench is located about 300 ft east of IHSS 166.1 and is estimated to have dimensions of 20 x 100 ft.

IHSS 166.1 and 166.2 received uranium- and/or plutonium-contaminated sludge from the Sewage Treatment Plant. No other materials or wastes are known to have been placed in these trenches. Materials placed in IHSS 166.3 are unknown, but it is probable that sewage sludge was also placed within this trench.

#### 1.5.6 Sludge Dispersal Area (IHSS 141)

The Sludge Dispersal Area (IHSS 141) is located along the eastern perimeter of the security area of the RFP facility. The western half of this IHSS is located within the security area of the plant and the eastern half is located within the buffer zone. Located on the western half of this IHSS are two corrugated metal buildings which cover the present day drying beds of the Sewage Treatment Plant. The eastern half of this IHSS gently slopes eastward toward South Walnut Creek and the B-Series Ponds. Two paved roads cross this IHSS in a north-south direction. One of the roads is within the security area while the other is located in the buffer zone. A drainage

ditch separates these two roads, with the ditch being located on the outside of the security fence. The water which collects in this drainage ditch flows out and into the B-Series Detention Ponds.

Laundry effluent was the only known radioactive effluent entering the drying beds between 1969 and 1972. By the latter half of 1972, however, plumbing changes were made and all plant wastes were channeled through the Sewage Treatment Plant and then into the drying beds. This resulted in increased radioactivity levels in the sludges. An overflow incident in June 1972 from Building 701 contributed elevated levels of plutonium to the effluent entering the Sewage Treatment Plant, and subsequently to the drying beds.

#### 1.5.7 Triangle Area (IHSS 165)

The Triangle Area (IHSS 165) is located within the security area of the RFP facility between the northeast Perimeter Road on the north and Spruce Avenue on the south. This IHSS covers approximately 250,000 sq ft. The western two-thirds of this unit is in the security area. The security area fencing crosses through the eastern one-third of this IHSS in a north-south direction. The Triangle Area is not paved, is sparsely vegetated, and has been partially covered with gravel fill, with unknown thickness. The Triangle Area was used as a storage site for miscellaneous wastes between 1966 and 1975. In 1966 the area was used to store drums for the first time. These drums were directly placed on the ground until the spring of 1967, when the Chemical Operations Department placed them on pallets. The Triangle Area is presently used as a storage yard for various types of equipment and pipes. The southwestern corner of this IHSS overlaps slightly with IHSS 176 of OU10.

#### 1.5.8 Old Outfall (IHSS 143)

The Old Outfall (IHSS 143) was located to the northwest of Building 773 (Guard Station) and Building 771 within the security area of the plant. This unit is approximately 30,000 sq ft, and has been covered with fill (amount unknown). Temporary trailers are currently situated on and near this IHSS. Because of the construction activities in this area, the existing drainage system is different from the drainage system that existed during the operation of the outfall. The Old

Outfall acted as a catchment basin that received liquids from various sources, the primary one being the laundry holding tanks in Building 771.

#### 1.5.9 Soil Dump Area (IHSS 156.2)

The Soil Dump Area (IHSS 156.2) is located within the buffer zone, approximately 10 ft northeast of the northeastern boundary of the security area of the plant facility, and northeast of the Triangle Area (IHSS 165). Geographically, this IHSS is on an east-west trending interfluvial that separates North and South Walnut creeks in the vicinity of the A-Series and B-Series Detention Ponds. A dirt road crosses through this unit in a northeast, southwest direction. The Soil Dump Area covers an area of approximately 255,000 sq ft.

The Soil Dump Area was an area that received between 50 to 75 dump truck loads of soil containing low levels of plutonium. These soils were excavated during the construction of Parking Area No. 334 located in the middle of the western half of the plant production area. However, the excavated soils removed from the Parking Area originally had been excavated around and near Building 774. Building 774 is located approximately 100 ft east of Building 771 near the Old Outfall Area. Asphalt debris and concrete remains were also found within the Soil Dump Area.

## 2.0 HEALTH AND SAFETY RESPONSIBILITIES

### 2.1 INTRODUCTION

Operable Unit 6 is being managed by the RFP Remediation Programs (RP) Department, which reports to the Environmental Restoration (ER) Directorate.

The RFP health and safety-related disciplines that support ER activities at OU6 include Industrial Safety, Radiological Engineering, Industrial Hygiene, Radiological Operations, Radiation Protection Area Management, Fire Protection, and Occupational Health. The health and safety organization chart for OU6 is shown in Figure 2-1.

The Project Manager (PM) for OU6 has overall responsibility for work performed at the site. The PM, through line management and supervisors, has responsibility for implementing and abiding by the SSHSP. The ER Health and Safety Officer (ERHSO), with support from the health and safety-related disciplines, will assist the PM in coordinating the implementation of the SSHSP. Subcontractors will submit a SSHSP covering subcontractor activities to EG&G for review and approval prior to initiating work at the site.

### 2.2 ASSIGNMENT OF RESPONSIBILITIES

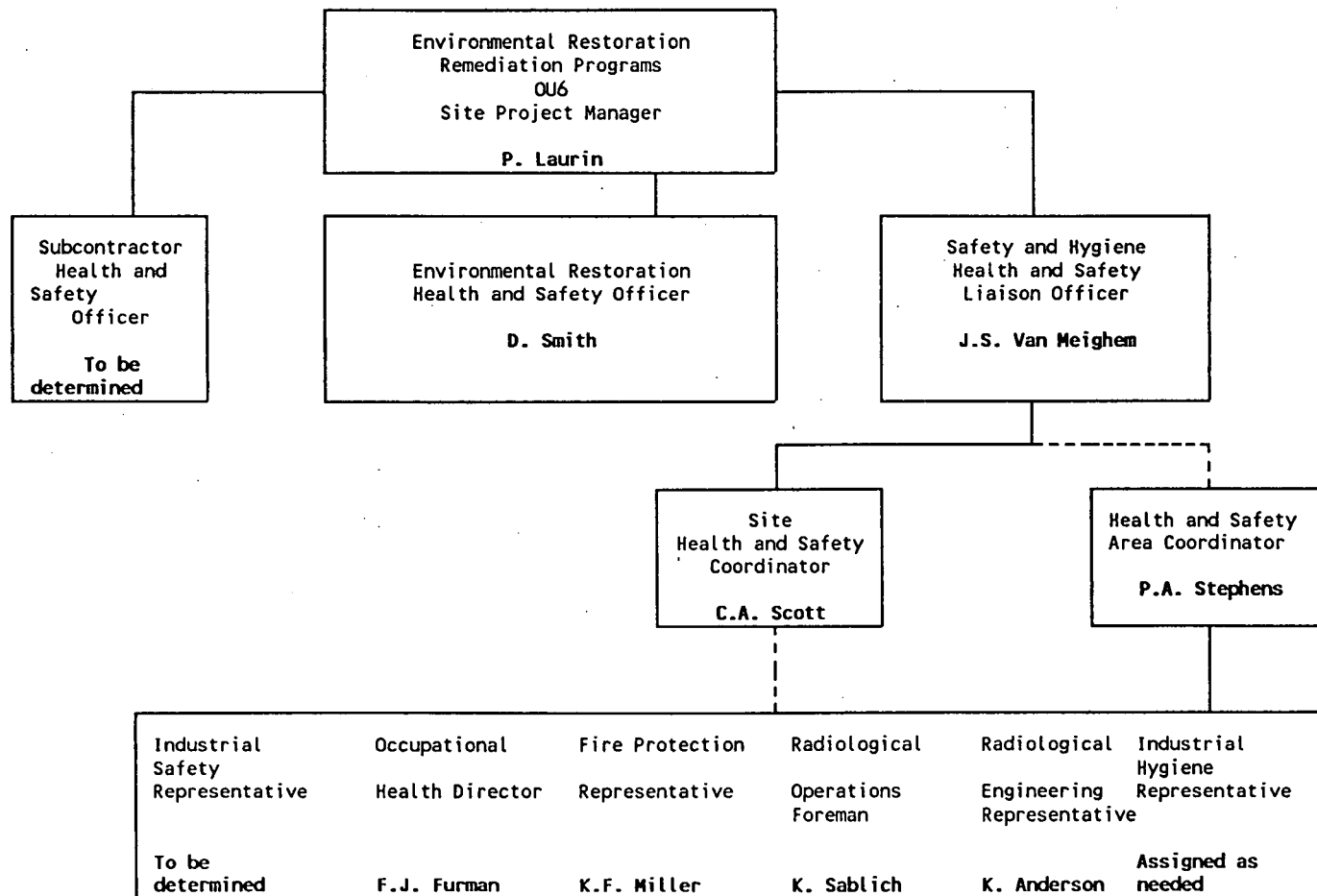
#### 2.2.1 Department Managers

The RP department and health and safety-related discipline managers assist the OU6 PMs in the implementation of environmental and health and safety activities.

#### 2.2.2 Remediation Program Project Manager

The RP PM for OU6 has overall responsibility for management of the project. The PM is responsible for plans and procedures; implementing the SSHSP; directing, controlling, and reporting project activities; maintaining construction and health and safety documents; and communicating project requirements, including any modifications of the project scope, to the support organizations. The PM will also measure project progress, monitor the budget, evaluate project performance, ensure compliance with health and safety regulations and procedures; serve

**Figure 2-1**  
**Health and Safety Organization for Operable Unit 6**



as a liaison with the DOE Rocky Flats Office, EPA, and CDH; and have "stop work" authority. The PM will report directly to the RP Department Manager.

#### 2.2.3 Environmental Restoration Health and Safety Officer

The ERHSO has responsibility for assisting the PM in implementing the SSHSP. Specific responsibilities include the following:

- Ensuring that an EG&G SSHSP is written for each operable unit
- Ensuring that subcontractors submit SSHSP for approval prior to initiating site work
- Ensuring that a subcontractor Health and Safety Officer is assigned to the operable unit
- Ensuring that adequate safety support and review procedures are established so that site personnel are not at risk while working at the site.

In situations of noncompliance with health and safety requirements, the ERHSO will consult with the PM and initiate corrective actions. The ERHSO will be assisted by the Health and Safety Liaison Officer.

#### 2.2.4 Subcontractor Health and Safety Officer

The subcontractor HSO is responsible for developing and implementing the subcontractor SSHSP that adequately addresses the site hazards and controls necessary to safeguard personnel and property. Duties of the subcontractor HSO include the following:

- Ensuring that subcontractor personnel are adequately trained so that they can safely perform their assigned tasks
- Ensuring that subcontractor personnel are aware of potential site hazards, and that they know the necessary controls to prevent overexposure or injury
- Appointing alternate subcontractor HSO(s)
- Ensuring that the subcontractor SSHSP and the required training and medical records for subcontractor personnel are current and are maintained on site

- Conducting any required monitoring or assuring that monitoring is conducted by the assigned personnel for subcontractor activities.

#### **2.2.5 Health and Safety Liaison Officer**

The Health and Safety Liaison Officer is assigned by Safety and Hygiene to serve as the central point of contact for supporting RP projects with operational health and safety needs. The Health and Safety Liaison Officer reports directly to the Safety and Hygiene Department Manager and interacts with the PM and the ERHSO. The Health and Safety Liaison Officer has the following responsibilities:

- Assisting project management
- Preparing the EG&G Operable Unit SSHSP
- Approving the SSHSP prepared by subcontractors
- Appointing and supervising the Site Health and Safety Coordinator (SHSC)
- Performing periodic audits of the implementation of the SSHSP and program documentation requirements.

#### **2.2.6 Site Health and Safety Coordinator**

The SHSC regularly monitors implementation of the EG&G Operable Unit SSHSP. The SHSC reports to the Health and Safety Liaison Officer and informs the PM of the status of health and safety operations at the site. The SHSC has the following responsibilities:

- Monitoring the project to ensure that the requirements of this SSHSP are implemented
- Coordinating with the Health and Safety Liaison Officer regarding the need for additional safety support required at OU6 from the health and safety disciplines such as Industrial Safety, Industrial Hygiene, Radiation Protection Area Management, Radiological Engineering, Radiological Operations, Occupational Health, and Fire Protection
- Performing audits of subcontractor health and safety operations
- Alerting the PM and the Health and Safety Liaison Officer of health and safety violations
- Approving modified work practices in response to changing conditions at OU6.

#### 2.2.7 Health and Safety Area Coordinator

The Health and Safety Area Coordinator is responsible for management of a multidisciplinary health and safety team. As the team leader, the Health and Safety Area Coordinator will ensure effective communication within the health and safety-related disciplines that support OU6 operations as well as with the SHSC. In addition, the Health and Safety Area Coordinator will assist OU6 management with completion of Operational Safety Analysis and Job Safety Analyses where required.

#### 2.2.8 Industrial Hygiene Representative

The Industrial Hygiene Representative is responsible for preparing and implementing the chemical monitoring program for EG&G employees working at OU6. This includes initial evaluation of the site to ensure that levels of respiratory and clothing protection are adequate and to ensure generation of sufficient data upon which further PPE decisions can be based. In addition, the Industrial Hygiene Representative is responsible for addressing industrial hygiene complaints and concerns at OU6 and for reviewing and approving subcontractor sampling and monitoring plans.

#### 2.2.9 Radiological Engineering Representative

The Radiological Engineering Representative defines the requirements for radiation protection for OU6 as required by the Rocky Flats Radiation Control Program and DOE requirements. The Radiological Engineering Representative will define the protocols for monitoring, clothing, respiratory protection, and decontamination for EG&G personnel in accordance with prudent health physics practices. Complaints and concerns regarding radiological hazards at OU6 will be addressed by the Radiological Engineering Representative.

#### 2.2.10 Radiological Operations Foreman

The Radiological Operations Foreman has responsibility for providing qualified Radiation Protection Technicians (RPT) to OU6 to implement the radiological monitoring program. The RPT will performance check the radiation monitoring equipment, conduct monitoring, and know



the action levels for radiological contamination defined in this plan. RPT practices will be in conformance with the ROI. The RPT will be responsible for notifying on-site supervisors when action levels are approached or reached and for notifying project and task managers in the event of equipment failure. The RPT is also responsible for clearing personnel and equipment to leave OU6 and for documenting the monitoring results.

#### 2.2.11 Fire Protection Representative

The Fire Protection Representative is responsible for minimizing the potential for damage and injury to health and property as a result of fire or explosion. This is accomplished by ensuring that adequate fire suppression systems are available site-wide, that audits and inspections are conducted to abate potentially hazardous situations (e.g., improper storage of flammable or combustible materials), and providing emergency support in the event of an injury or accident.

#### 2.2.12 Occupational Health Director

The Occupational Health Director is responsible for administration of the RFP Occupational Health Program. These responsibilities include the following:

- Providing requisite physical examinations to EG&G employees working at hazardous waste sites
- Maintaining EG&G employee medical records
- Correlating exposure data to ensure that the scope of annual physical examinations are correct
- Informing EG&G employees of potential exposures to hazardous materials based on bioassays.

#### 2.2.13 Industrial Safety Representative

The Industrial Safety Representative is responsible for providing safety support to EG&G activities at OU6 field sites. The representative is also responsible for conducting periodic safety audits of EG&G and subcontractor operations.

THIS TARGET APPEARS INTENTIONALLY  
TO ENSURE DOCUMENT INTEGRITY.

Environmental Restoration  
RP OU6 Project Manager  
Pete Laurin  
Extension 8702

Environmental Restoration  
Health and Safety Officer  
Dennis Smith  
Extension 5958/pager 3836

Health and Safety Liaison  
Officer  
J.S. Van Meighem  
Extension 5810/pager 3055

Site Health and Safety  
Coordinator  
C.A. Scott  
Extension 2183/pager 0066

Health and Safety Area  
Coordinator  
P.A. Stephens  
Extension 4831/pager 3307

Industrial Hygiene  
Representative  
Assigned as needed  
Call 2780

Radiological Operations  
Foreman  
Kenneth Sablich  
Extension 4414/pager 4361

Radiological Engineering  
Representative  
Keith Anderson  
Extension 5151/pager 3296

Industrial Safety  
Representative  
To be determined  
Extension 2955

Occupational Health Director  
F.J. Furman  
Extension 2895/pager 2356

Fire Protection/EMT  
Representative  
For Emergency Response  
Issues:  
K.F. Miller  
Extension 6042

For Fire Protection Issues:  
Bruce Campbell  
Extension 7642/pager 0023

### 3.0 HAZARD ASSESSMENT

#### 3.1 INTRODUCTION

The field work that will be conducted at OU6 include potential chemical, radiological, physical, biological, and mechanical hazards. These potential hazards were identified by reviewing site histories, previous sampling results, and work plans for the OU. The Phase I RFI/RI is designed to provide additional information concerning potential hazards associated with each IHSS; therefore, it is not possible to identify all chemical and radiological hazards associated with field work at the present time. The use of standard measures such as PPE, worksite chemical and radiological monitoring, work practice controls, and training should assist in identifying, evaluating, and controlling potential hazards at the work site that are not currently known.

Based on available information about the site, most of the work will be conducted in areas where severity of potential hazards are expected to be low. The potential for encountering chemical or radiological hazards will depend on each IHSS, what types of compounds were disposed at the site, and what work is being performed. Environmental physical and biological hazards, such as insects, heat and cold stress, and noise, will likely be encountered to some degree while working in the IHSS areas. The degree of mechanical hazards resulting from motor vehicle or boat operation, use of heavy equipment, power tools, etc., will also depend on the work being performed. A summary of site activities, hazards, monitoring requirements, and control methods for each IHSS is presented in Table 3-1.

#### 3.2 POTENTIAL CHEMICAL AND RADIOLOGICAL HAZARDS

##### 3.2.1 Pathways and Exposure Routes

Pathways of exposure to chemical and radiological hazards are directly dependent upon investigative activities performed at OU6. Exposure to potential health hazards may occur during activities involving soil gas surveys, surface and subsurface soil sampling, drilling activities, groundwater sampling and measurement efforts, and other intrusive activities. Exposure pathways include the following:

TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
142.1, 142.2, 142.3, 142.4, and 142.12 A-Series Ponds	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, air sampling, radiation monitoring, and surface water sampling	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water, and sediments</p> <p>Radioisotopes in sediment and surface water samples were found to be at or near background levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	Initial monitoring of the site by qualified health and safety personnel to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p>
	Intrusive activities such as subsurface soil sampling, sediment sampling, well installation, and groundwater sampling	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water, sediments and groundwater</p> <p>Radioisotopes in sediment, groundwater, and surface water samples were found to be at or near background levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	<p>Organic vapor monitoring in accordance with EMD FO.15</p> <p>Airborne dust monitoring in accordance with EMD FO.01</p> <p>Radiation surveys including personnel and equipment contamination surveys in accordance with EMD FO.16, EMRG, and ROI procedures as applicable</p>	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Set up exclusion zones, contaminant reduction zones, and support zones</p> <p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p> <p>Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08</p>

TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
142.5, 142.6, 142.7, 142.8, and 142.9 B-Series Ponds	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, air sampling and radiological monitoring, and surface water sampling	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water and sediments</p> <p>Radioisotopes in sediment and surface water samples were found to be at or near background levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	Initial monitoring of the site by qualified health and safety personnel to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p>
	Intrusive activities such as sediment sampling, subsurface soil sampling, well installation, and groundwater sampling	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water, groundwater and sediments</p> <p>Radioisotopes in sediment, groundwater, and surface water samples were found to be at or near background levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	<p>Organic vapor monitoring in accordance with EMD FO.15</p> <p>Airborne dust monitoring in accordance with EMD FO.01</p> <p>Radiation surveys including personnel and equipment contamination surveys in accordance with EMD FO.16, EMRG, and ROI procedures as applicable</p>	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Set up exclusion zones, contaminant reduction zones, and support zones</p> <p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p> <p>Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08</p>

TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
167.1, 167.2, and 167.3 North, South, and Pond Area Spray Fields	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, air sampling, and radiation monitoring	Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water  Radioisotopes in surface water samples were found to be at or near background levels  Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards	Initial monitoring of the site to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted  Work authorization in accordance with the EG&G Integrated Work Control Program
	Intrusive activities such as surface soil sampling, sediment sampling, subsurface soil sampling, soil borings, groundwater sampling, and well installation	Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water and groundwater  Radioisotopes in surface water samples were found to be at or near background levels with the exception of sampling location SW-100 where concentrations were elevated significantly above detection levels  Groundwater samples were found to be at or near detection levels.  Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards	Organic vapor monitoring in accordance with EMD FO.15  Airborne dust monitoring in accordance with EMD FO.01  Radiation monitoring including personnel and equipment contamination surveys will be conducted in strict accordance with the EMD FO.16, EMRG, and ROI procedures as applicable	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	Set up exclusion zone or contaminant reduction zone, and support zone  Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06  Work authorization in accordance with the EG&G Integrated Work Control Program  Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08

TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
216.1 East Area Spray Field	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, air sampling and radiological monitoring	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in the water from Pond B-3, which was used to spray on this area</p> <p>Radioisotopes from this water were also found to be at or near background levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	Initial monitoring of the site to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p>
	Intrusive activities such as surface soil sampling, and subsurface soil sampling	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in the water from Pond B-3, which was used to spray on this area</p> <p>Radioisotopes from this water were also found to be at or near background levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	<p>Organic vapor monitoring in accordance with EMD FO.15</p> <p>Airborne dust monitoring in accordance with EMD FO.01</p> <p>Radiation surveys including personnel and equipment contamination surveys with EMD FO.16, EMRG, and ROI procedures as applicable</p>	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Set up exclusion zones, contaminant reduction zones, and support zones</p> <p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p> <p>Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08</p>



TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
166.1, 166.2, and 166.3 Trenches A, B, and C	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, geophysical surveys, air sampling and radiation monitoring	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in soil samples, and surface water</p> <p>Radioisotopes in soil samples and surface water and samples were found to be at or near background levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	Initial monitoring of the site to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p>
	Intrusive activities such as soil classification surveys, subsurface soil sampling, soil borings, well installation, and groundwater monitoring	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water and groundwater</p> <p>Radioisotopes in soil and surface water samples were found to be at or near background levels, while groundwater concentrations were found to be at or near detection levels</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	<p>Organic vapor monitoring in accordance with EMD FO.15</p> <p>Airborne dust monitoring in accordance with EMD FO.01</p> <p>Radiation surveys including personnel and equipment contamination surveys in accordance with the EMD FO.16, EMRG, and ROI procedures as applicable</p>	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Set up exclusion zones, contaminant reduction zones, and support zones</p> <p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p> <p>Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08</p>

TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
141 Sludge Disposal Area	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, air sampling and radiological monitoring	Chemical hazards include possible exposure to low levels of organics and metals which were received in this area prior to 1983 and were detected in surface water in the vicinity  Radioisotopes in surface water samples were found to be at or near background levels  Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards	Initial monitoring of the site to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted  Work authorization in accordance with the EG&G Integrated Work Control Program
	Intrusive activities such as subsurface soil sampling, surface soil sampling, well installation, and groundwater sampling	Chemical hazards include possible exposure to low levels of organics and metals which were received in this area prior to 1983 and were detected in surface water in the vicinity  Radioisotopes in surface water samples were found to be at or near background levels, while groundwater concentrations were found at or near detection levels  Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards	Organic vapor monitoring in accordance with EMD FO.15  Airborne dust monitoring in accordance with EMD FO.01  Radiation surveys including personnel and equipment contamination surveys in accordance with the EMD FO.16, EMRG, and ROI procedures as applicable	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	Set up exclusion zones, contaminant reduction zones, and support zones  Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06  Work authorization in accordance with the EG&G Integrated Work Control Program  Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08

TABLE 3-1 OUG SUMMARY TABLE

IISS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
103 Hazardous Area	Nonintrusive activities in unexcavated areas such as walking on the surface of the HSP, observing container openings outside the exclusion zone or air sampling and radiation monitoring	Chemical hazards include possible exposures to low levels of organics and metals which were detected in soils. Radiological hazards are reported in previous HSP samples were of concern, however, the area is reportedly cleaned up to a level of 250 cpm or less. Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards	Initial monitoring of the site to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted. Work authorization in accordance with the EG&G Integrated Work Control Program
	Intrusive activities such as soil gas surveys, subsurface soil sampling, surface soil sampling, well installation, and groundwater sampling	Chemical hazards include possible exposure to low levels of organics and metals which were detected in groundwater. Radi isotopes found in previous soil samples were of concern, however, the area is reportedly cleaned up to a level of 250 cpm or less. Radi isotopes found in the groundwater are at or near detection levels. Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards	Organic vapor monitoring in accordance with EMD FO.15. Airborne dust monitoring in accordance with EMD FO.01. Radiation surveys including personnel and equipment contamination surveys will be conducted in strict accordance with the EMD FO.16, EMRG, and ROI procedures as applicable	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or book covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	Set up exclusion zones, and contaminant reduction zones, and support zones. Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06. Work authorization in accordance with the EG&G Integrated Work Control Program. Clearance of intrusive work or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08

TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
143 Old Outfall	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, air sampling and radiation monitoring	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water</p> <p>Radioisotopes in surface water samples were found to be at or near background levels, while radioisotope concentrations found in previous soil samples were of concern, however, the area is reportedly cleaned up to level of 250 cpm or less</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	Initial monitoring of the site to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p>
	Intrusive activities such as subsurface soil sampling, surface soil sampling, and fill sampling	<p>Chemical hazards include possible exposure to low levels of organics and metals which were detected in surface water</p> <p>Radioisotopes in surface water samples were found to be at or near background levels, while radioisotope concentrations found in previous soil samples were of concern, however, the area is reportedly cleaned up to a level of 250 cpm or less</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	<p>Organic vapor monitoring in accordance with EMD FO.15</p> <p>Airborne dust monitoring in accordance with EMD FO.01</p> <p>Radiation surveys including personnel and equipment contamination surveys in strict accordance with the EMD FO.16, EMRG, and ROI procedures as applicable</p>	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Set up exclusion zones, contaminant reduction zones, and support zones</p> <p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p> <p>Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08</p>

TABLE 3-1 OU6 SUMMARY TABLE

IHSS Number	Site Activities	Known or Suspected Chemical, Radiological, or Other Hazards Present	Monitoring Requirements	Initial Level of Protection	Other Controls
156.2 Soil Dump Area	Nonintrusive activities in uncharacterized areas such as walking on the surface of the IHSS, observing contractor operations outside the exclusion zone or contaminant reduction zone, air sampling, and radiation monitoring	<p>A summary of chemical and radiological hazards for this site is not available, but it is known that an unknown volume of low level plutonium contaminated soil was dumped into this area</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	Initial monitoring of the site to determine background levels of potential chemical and radiological hazards. If background levels are acceptable, no further monitoring is required unless field conditions change	Level D including cotton or disposable coveralls, safety boots/shoes, safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06 if potentially contaminated materials are contacted</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p>
	Intrusive activities such as subsurface soil sampling, surface soil sampling, well installation, and groundwater sampling	<p>A summary of chemical and radiological hazards for this site is not available, but it is known that an unknown volume of low level plutonium contaminated soil was dumped into this area</p> <p>Other potential hazards include the use of heavy machinery, noise, temperature extremes, uneven walking/working surfaces, boating hazards and biological hazards</p>	<p>Organic vapor monitoring in accordance with EMD FO.15</p> <p>Airborne dust monitoring in accordance with EMD FO.01</p> <p>Radiation surveys including personnel and equipment contamination surveys in accordance with the EMD FO.16, EMRG, and ROI procedures as applicable</p>	Level D including cotton or disposable coveralls, chemical resistant safety boots/shoes or boot covers (as needed), safety glasses with side shields (as needed), nitrile gloves if handling potentially contaminated media, and hard hats if overhead hazards are present	<p>Set up exclusion zones, contaminant reduction zones, and support zones</p> <p>Personnel decontamination at field site and equipment decontamination in accordance with EMD FO.03, FO.04, and FO.06</p> <p>Work authorization in accordance with the EG&amp;G Integrated Work Control Program</p> <p>Clearance of intrusive work location for underground utilities or hazards by the Soil Disturbance Committee per HSP Manual Section 12.08</p>

- Inhalation of volatile organic compounds, fugitive dust containing metals, and fugitive dust contaminated with radionuclides
- Skin absorption or contact with volatile organic compounds, or other chemical compounds that may be absorbed through the skin
- Inadvertent ingestion of low-volatility organic chemicals absorbed to dust particles or fugitive dust contaminated with metals and/or radionuclides
- Injection of radionuclides, metals, or other chemical compounds into the body through the skin.

### 3.2.2 Chemical Hazards

#### 3.2.2.1 Airborne Exposures to Volatile Organic Compounds

Varying concentration levels of volatile organic compounds may exist at sites within OU6. Previous dumping or spill sites of volatile organic compounds where contamination has not been removed will likely have the highest potential for exposure. Exposure may occur during intrusive activities (i.e., soil gas surveys, soil sampling, borehole installation, monitoring well and piezometer installation, or excavation), which can release volatile organic compounds into the worker's breathing zone. Periodic air monitoring, work practice controls, and the use of respiratory protection will be used as the primary evaluation and control methods to prevent exposure to airborne volatile organic compounds.

#### 3.2.2.2 Skin Exposures to Volatile Organic Compounds

The presence of volatile organic compounds at sites in OU6 could lead to dermal exposures to workers. Dermal exposure could lead to local skin irritation or absorption into the body through the skin. Contamination avoidance and proper use of PPE (clothing and gloves) will be primary control measures used to prevent skin exposure.

### 3.2.2.3 Inadvertent Ingestion of Contaminants

The potential exists for workers to be exposed to hazardous chemical compounds through inadvertent ingestion. This exposure route is considered to be remote if site workers follow good personal hygiene measures prior to eating, drinking, or smoking.

### 3.2.3 Radiological Hazards

#### 3.2.3.1 Airborne Exposures to Radiological Hazards

Exposure to radiological hazards could occur through inhalation of fugitive dust contaminated with radiological materials. The degree of potential exposure to airborne radiological hazards is considered unlikely or low depending on the individual work site and amount of airborne dust created at the site. Most all work sites reportedly have low or below background levels of radionuclides and the intrusive activities to be performed usually generate low quantities of airborne dust. Unknown radiological contamination at the site (e.g., buried contaminated material) could lead to unexpected generation of airborne radiological hazards. The use of initial site surveys, air monitoring, geophysical surveys, work practice controls (e.g., minimizing dust generation), dust control practices, and proper use of PPE and respirators will be the primary evaluation and control measures used to prevent inhalation of radioactive materials.

#### 3.2.3.2 Skin Exposures to Radiological Hazards

Radioactive materials identified at sites in OU6 are not readily absorbed through the unbroken skin. Contamination avoidance, decontamination, and proper use of protective clothing and gloves will be the primary control methods used to prevent skin contamination.

#### 3.2.3.3 Inadvertent Ingestion of Radionuclides

Ingestion of radionuclides is possible during OU6 site work. The potential for exposure via this pathway is considered to be remote if good personal hygiene practices are followed prior to eating, drinking, or smoking.

#### 3.2.3.4 Puncture Wounds

Radiological materials could enter the body through breaks in the skin such as a cut, laceration, puncture, abrasion, or burn. This route of entry will be controlled through complying with safe work practices to prevent accidents. If accidents occur possibly leading to radiation exposure, procedures given in ROI 2.3 or EMRG 2.3 will be implemented.

#### 3.2.4 Metals Contamination Hazards

##### 3.2.4.1 Pathways and Exposure Routes

The concentration of metals throughout OU6 will be more fully evaluated during the remedial investigation. Normal background levels have not yet been established. However, some metals have been detected above the Contract Required Quantitation Limit (CRQL) and may pose a health hazard depending on the metal present and the concentration.

##### 3.2.4.2 Inhalation or Ingestion Exposure to Fugitive Dust Contaminated with Metals

Workers could be exposed through inhalation or inadvertent ingestion of fugitive dust contaminated with metals during intrusive activities. These activities, along with weather conditions, could cause dust entrainment into the air and subsequently into the workers' breathing zone. The ingestion of metals into the body can be avoided by good personal hygiene practices prior to eating, drinking, or smoking.

The degree of potential exposure from contact with metal contaminants during investigation activities in OU6 is believed unlikely or low, depending on the work activity and individual work location. The use of air monitoring, work practice controls (e.g., minimizing dust generation and personal hygiene), and proper use of PPE and respirators will be used as the primary evaluation and control methods to prevent inhalation or ingestion of metals.



### 3.3 PHYSICAL HAZARDS

Workers at sites within OU6 are potentially subjected to physical stresses, including heat and cold stress and noise exposure. Investigative activities may take place during a wide range of weather conditions leading to possible heat or cold stress conditions. Unacclimatized workers or workers wearing impermeable personal protective clothing during warm weather may be susceptible to heat stress. High noise exposure is possible when operating power tools and mechanized equipment.

#### 3.3.1 Cold Exposure

When working outdoors in temperatures below freezing, workers are susceptible to frostbite. Exposure to extreme cold can cause severe injury to the body surface or can result in profound generalized cooling, causing death. In cold weather, precautions should be taken to prevent cold exposure by wearing properly insulated garments and taking warm-up breaks in temperature controlled areas when necessary. Symptoms of cold exposure include the following:

- Incipient frostbite or frost nip, characterized by sudden blanching or whitening of the skin
- Superficial frostbite, which causes the skin to become waxy or white and superficially firm, but resilient beneath
- Deep frostbite, characterized by cold, pale, solid skin tissues
- Systemic hypothermia, caused by exposure to freezing or rapidly dropping temperature. Symptoms are usually exhibited in stages. These include shivering, apathy, listlessness, sleepiness, rapid cooling of the body temperature to less than 95° Fahrenheit (°F), unconsciousness, glassy stare, slow pulse and slow respiratory rate, freezing of the extremities, and death.

#### 3.3.2 Heat Stress

A worker's risk for developing heat stress is greatly increased when wearing impermeable, personal protection clothing. This type of clothing limits the body's normal heat exchange mechanisms and increases energy expenditure. A program to recognize potential heat stress situations, prevent episodes and hazard control will be implemented where necessary. The program would include adequate rest breaks, fluid replacement, acclimatization, and personal

cooling systems. Heat stress can cause health effects that range from heat fatigue to serious illness or death. Signs and symptoms of heat stress include the following:

- Heat rash, which may result from continuous exposure to heat or humid air
- Heat cramps, caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms, or pain in hands, feet or abdomen.
- Heat exhaustion, which occurs from increased stress on various body organs or systems, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; or fainting.
- Heat stroke is the most serious form of heat stress. The body's temperature regulation system fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained immediately. Signs and symptoms of heat stroke are red, hot, usually dry skin; reduced or lack of perspiration; nausea; dizziness and confusion; strong, rapid pulse; or coma.

### 3.3.3 Noise Exposure

Workers may be exposed to high noise levels during investigative activities at OU6, primarily from drill rigs and other mechanized equipment in use at the site. Noise exposure will be controlled to levels below those stipulated in Table 3-2. Employees exposed to noise levels in excess of levels shown in Table 3-2 will participate in the EG&G or subcontractor Hearing Conservation Program.

## 3.4 BIOLOGICAL HAZARDS

Biological hazards that may be present at RFP include plants, insects, and snakes. Considerations for potential biological hazards may be necessary when workers are required to enter remote or seldom-visited locations.

The potential for contact with snakes or insects that may cause injury or disease exists when performing investigative activities at RFP. The RFP does not host any plants that are poisonous to humans, other than poison ivy. There are some plants that may be mechanically injurious (i.e.,

Table 3-2  
Threshold Limit Values for Noise<sup>1</sup>

Duration per Day (Hours)	Sound Level dBA <sup>2</sup>
16	80
8	85
4	90
2	95
1	100
1/2	105
1/4	110
1/8	115 <sup>3</sup>

<sup>1</sup> From "Threshold Limit Values and Biological Exposure Indices for 1989-1990," American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.

<sup>2</sup> Sound levels in decibels (dBA) are measured on a sound meter, conforming as a minimum to the requirements of the American National Standards Specification for Sound Level Meters, S1.4 (1971 Type S2A, and set to use the A-weighted network with slow meter response).

<sup>3</sup> No exposure to continuous or intermittent noise in excess of 115 dBA.

thorns). Field personnel will wear sturdy work clothes and shoes in order to help prevent injuries.

There is one type of venomous snake present in the RFP area, the prairie rattlesnake. Personnel should be aware that snakes may be present in the area and exercise caution, especially when working in previously undisturbed areas and locations with animal dens.

Black widow spiders and scorpions may be present on site. They are usually found in shady places or under rocks or wood. The black widow spider has a shiny black body about the size of a pea, with a red or yellow hourglass-shaped mark on its abdomen. It weaves shapeless webs in undisturbed areas. A bite may result in severe pain, illness, and possibly death from complications, but usually not from the bite itself.

There are several types of scorpions native to Colorado. Scorpions may be brown to yellowish in color, and range from 1/2 inch to 8 inches in length. Their bodies are divided into two parts - a short, thick, upper body, and a long abdomen with a six-segmented tail. A scorpion has six pairs of jointed appendages -- one pair of small pinchers, one pair of large claws, and four pairs of jointed legs. They are most active at night. A scorpion sting is very painful, but usually will not result in death.

In addition to spiders and scorpions, ticks, chiggers, bees, and wasps may be nuisances to field personnel. Bites from wood ticks may result in the transmission of Rocky Mountain Spotted Fever, a serious and possibly fatal viral disease. The *Rickettsia* virus infects wood ticks, mostly in the late spring and early summer, and is characterized by chills, fever, severe pain in leg muscles and joints, and a body rash. Lyme Disease is not prevalent in Colorado. Personal protective equipment will offer some protection, but the use of insect repellent on outside clothing also may be warranted. Personnel should perform self-searches after each day to check for ticks and chiggers. Bees or wasps can be considerable hazards for those people with allergic reactions to venom. The subcontractor HSO or SHSC should be notified if any worker is

sensitive to these insects. Properly trained personnel will administer first aid should a bee or wasp sting occur.

### 3.5 MECHANICAL HAZARDS AND BOATING SAFETY

Workers may be exposed to potential mechanical hazards during the investigative activities at OU6. Hazards and methods of hazard control may be detailed in Standard Operating Procedures (SOPs) and Operation Safety Analyses (OSAs) for specific tasks performed during ER site activities. Site inspections will be conducted periodically to assess hazards according to standard health and safety protocols given in the EG&G HSPM.

Common sense is the best accident prevention method for boat accidents. Only experienced boat operators may operate project boats. These personnel will have operated similar boats prior to their work on this project. Only row boats will be used for pond investigations. No motorized boats are permitted.

The boat operator will present a safety briefing to all occupants of the boat prior to leaving the dock or shore. Boats are to be occupied during use by not less than one qualified operator plus one additional employee. Project personnel shall comply with U.S. Coast Guard (USCG) boating requirements, and wear USCG-approved personal flotation devices at all times when operating or being transported by boat.

### 3.6 POTENTIAL CHEMICAL OR RADIOLOGICAL HAZARDS AND CONTROL METHODS SUMMARY

Each IHSS in OU6 is discussed below. Site background summaries are compiled from existing data in the OU6 Phase I RFI/RI Work Plan and previous sampling reports. Potential chemical and radiological hazards listed are based only on these data or known past use of the site. The control measures listed are meant to be the minimum control measures required for initial work at the site. Additional control measures may be necessary as determined by site health and safety personnel. As additional site data become available through site monitoring or investigations,

the control measures may need to be altered. The decision to alter the control measures should be made only by knowledgeable health or safety professionals responsible for site activities.

For potential radiological hazard areas, screening or monitoring activities may be required as a control measure. The applicable ROI will govern the radiological procedures and practices used by EG&G personnel at EG&G-controlled sites. The applicable EMRG will govern the radiological procedures and practices used by subcontractor personnel at subcontractor-controlled sites.

3.6.1 A-Series Ponds A-1, A-2, A-3, A-4 and A-5 (IHSS 142.1, 142.2, 142.3, 142.4, and 142.12)

3.6.1.1 Site Background Summary

Investigations have been conducted on the water and sediment quality of the A-Series Ponds and stream sediments of North Walnut Creek. A 1979 study concerning radioactivity associated with the pond sediments concluded that most of the plutonium detected was in the pond sediments and that the amount of plutonium in the water depended to a great extent on the amount of suspended material in the sample. Sediments showed an extremely high affinity for plutonium; the adsorption and fixation of plutonium by sediments was rapid and essentially irreversible. The highest plutonium concentrations found within the pond sediments were found at subsurface depths rather than on the sediment surface. The resulting data from this study are unavailable.

Surface water samples collected from the vicinity of the A-Series ponds showed volatile organic compound concentrations in the parts per billion (ppb) range. Pesticides such as atrazine and simazine were found in parts per million (ppm) concentrations, and mercury was detected at ppb levels. Radionuclides were also found in surface water at concentrations above the CRQL. Surface water samples collected from Pond A-1 had maximum plutonium concentrations of 0.24 picocuries per liter (pCi/L). Water quality in Pond A-2 was reported to be similar to the water in Pond A-1 with maximum plutonium concentrations of 0.17 pCi/L. Higher concentrations of uranium-233/234 (6.4 pCi/L) and uranium-238 (5.8 pCi/L) were measured from

Pond A-2, as compared to samples from Pond A-1. Pond A-3 water samples were reported to contain uranium-233/234 and uranium-238 concentrations similar to Pond A-2. Water quality of Pond A-4 was similar to background concentrations.

Groundwater data from this area show a few organics that were detected above the CRQL, but concentrations did not exceed the ppb range. Mercury was detected at ppb concentrations and other metals such as calcium, potassium, and sodium were found at ppm concentrations. Radionuclides were detected with the following maximum concentrations: americium-241 (0.4 pCi/L), gross alpha (125 pCi/L), gross beta (87 pCi/L), plutonium-239 (0.5 pCi/L), strontium-90 (24 pCi/L), uranium-233/234 (25 pCi/L), uranium-235 (3.4 pCi/L), uranium-238 (20 pCi/L), and total uranium (48.4 pCi/L).

Sediment sampling locations in the vicinity of the A-Series ponds revealed that some organic compounds were detected above the CRQL. However, the limited number of compounds detected above the CRQL probably indicates that they do not present a significant concern for this area. In addition to the organic compounds, most sediment sampling locations reported concentrations above the Contract Required Detection Limit for metals and radionuclides. These detected levels, however, may be representative of background concentrations. These results will be further evaluated during the remedial investigation.

The effluent, if any, from the pond east of the confluence of North and South Walnut creeks (IHSS 142.12) is sampled daily when discharging downstream into Walnut Creek. On-site analytical results from the effluent of IHSS 142.12 during August, September, and October of 1990 have been reviewed. Maximum concentrations for radionuclides include plutonium-239/240 (0.022 pCi/L), americium-241 (0.035 pCi/L), uranium-233/234 (1.11 pCi/L), and uranium-238 (1.09 pCi/L).

#### 3.6.1.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, site inspection, surface water sampling, air sampling, and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as subsurface soil sampling, sediment sampling, well installation, and groundwater sampling. Subcontractor work activities at the site are summarized in Table 7-2, Appendix B (EG&G, 1991). The use of boats may be required for surface water sampling. General boating safety procedures are outlined Section 3.5 of this SSHSP.

#### 3.6.1.3 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental activities at this site could include dermal exposure or inhalation of volatile organic compounds and metals, and possible ingestion or inhalation of radionuclides. The potential for this occurring is considered low based on the work activities to be performed, work practices, low concentration of contaminants in sediments and surface water, and low concentration of contaminants in the groundwater.

#### 3.6.1.4 Control Measures

Level D protection including EG&G-furnished gray coveralls (hereinafter referred to as cotton coveralls), safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for volatile organic compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedure FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.



### 3.6.2 B-Series Ponds B-1, B-2, B-3, B-4, and B-5 (IHSS 142.5, 142.6, 142.7, 142.8, and 142.9)

#### 3.6.2.1 Site Background Summary

An accidental release of water containing low concentrations of plutonium-239/240 into the sanitary waste system occurred in March 1971. In addition, reconstruction activities of each of the ponds between 1971 and 1973 also resulted in a significant increase in plutonium concentrations in the mean surface [top 5 centimeters (cm)] sediments of the ponds. The mean plutonium concentrations surface sediment samples from Ponds B-1 through B-4 are illustrated in Figure 3-1. Results of sediment sampling for pre- and post-construction activities of the ponds are tabulated in Table 3-3.

The 1986 study "Trends in the Rocky Flats Surface Water Monitoring" summarized analytical data collected between 1980 and 1985. The water quality of Pond B-1 showed concentrations of uranium-233/234 (6.4 pCi/L) and uranium-238 (9.6 pCi/L). Plutonium concentrations were recorded at 4.2 pCi/L. Organic compounds were detected in these samples, but were reported to be less than the detection limit. Water in Pond B-2, unlike the water in Pond B-1, contained background levels for the various radionuclides, with the exception of plutonium (0.37 pCi/L). Pond B-3 showed background levels for the radionuclides with the exception of plutonium, at a concentration of 0.08 pCi/L. Zinc was moderately elevated [0.58 milligrams per liter (mg/L)] and nitrate was present at 13.4 mg/L. Water in Pond B-4, which receives surface water runoff and occasional flow from Pond B-3, had levels of uranium-233/234 (1.5 pCi/L) and uranium-238 (2.1 pCi/L). Major ions were at relatively low concentrations and nitrates were undetected. Strontium and zinc occurred at 0.31 mg/L and 0.36 mg/L, respectively. Radionuclide data available from Pond B-5 showed concentrations of uranium-233/234 (2.6 pCi/L) and uranium-238 (2.1 pCi/L). All other radionuclides were at background levels.

SOURCE: PAINE, 1980

FIGURE 3-1

MEAN PLUTONIUM CONCENTRATIONS IN SURFACE SEDIMENTS (pci/g) AND MEAN PLUTONIUM CONCENTRATIONS IN UNFILTERED WATER (pci/l) FOR PONDS B-1, B-2, B-3, AND B-4

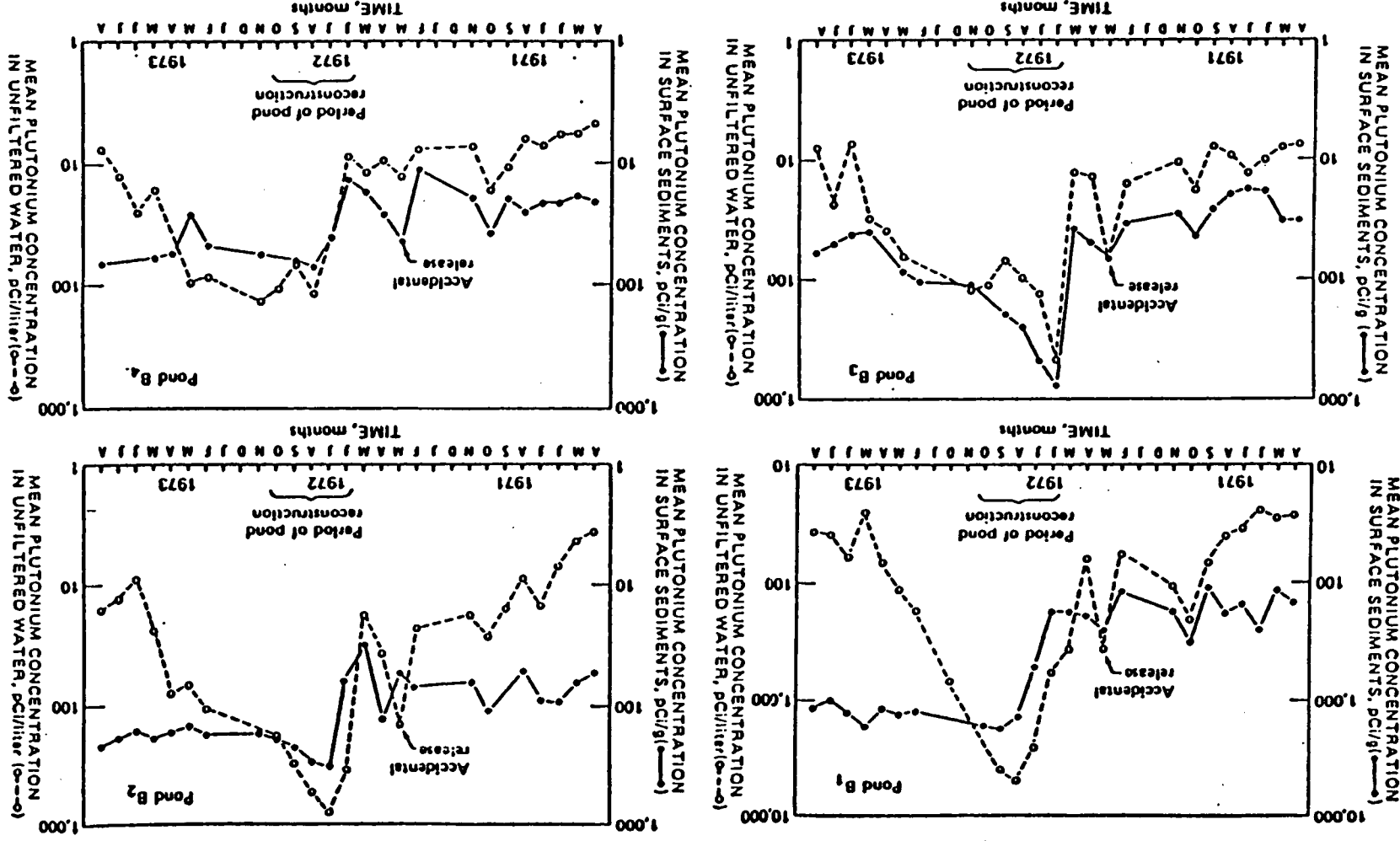


Table 3-3. Mean-Surface (Top 5 Centimeters)-Sediment Plutonium 239/240 Concentrations During Preconstruction and Postconstruction Periods.

Pond	Preconstruction		Postconstruction	
	n*	pCi/g†	n*	pCi/g†
B-1	13	200 ± 70	11	1300 ± 350
B-2	12	80 ± 30	11	200 ± 60
B-3	13	30 ± 10	11	200 ± 200
B-4	14	20 ± 10	10	55 ± 15

n\* = number of sampling periods

† = Mean ± standard error

Source: Paine, 1989

Groundwater data from the vicinity of the B-Series ponds show tetrachloroethene above the CRQL, but in ppb concentrations. Metals such as potassium, magnesium, and calcium were found in ppm concentrations. Uranium-238 was discovered at a concentration of 25.72 pCi/L.

#### 3.6.2.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive project management activities such as site inspection, surface water sampling, air sampling, and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as subsurface soil sampling, sediment sampling, well installation, and groundwater sampling. Subcontractor work activities at the site are summarized in Table 7-2, Appendix B (EG&G, 1991). The use of boats may be required for surface water sampling. General boating safety procedures are outlined in Section 3.4 of this SSHSP.

#### 3.6.2.3 Potential Chemical or Radiological Hazards

The primary hazard associated with site work would be potential contact with plutonium-contaminated sediments in and near the ponds. Other hazards associated with environmental contamination at this site are anticipated to be possible dermal exposure or inhalation of volatile organic compounds and metals. The potential for this occurring is considered low based on the work activities to be performed, work practices, low concentration of contaminants in the surface waters, and low concentration of contaminants in the groundwater.

#### 3.6.2.4 Control Measures

Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for total dust and volatile organic compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in

accordance with EMD Operating Procedures FO.16 and applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking. Due to the elevated plutonium concentrations in the sediments, site radiological monitoring and decontamination procedures will be strictly enforced.

### 3.6.3 North, South, and Pond Area Spray Fields (IHSS 167.1, 167.2, and 167.3)

#### 3.6.3.1 Site Background Summary

No previous studies have been conducted at these spray fields. However, there are some chemical analytical results from surface water samples collected from the West and East Landfill Ponds. These data are significant, since the water from the ponds was sprayed onto the spray fields.

Surface water data show acetone, phenol, 4-methylphenol, and methylene chloride to be in ppb concentrations. Metals were detected in ppm concentrations except for mercury which was found in the ppb range. Radionuclides were detected at the following concentrations: americium-241 (0.33 pCi/L), radium-226 (13 pCi/L), radium-228 (30 pCi/L), and total uranium (40 pCi/L). Gross alpha and gross beta concentrations were found at 210 pCi/L and 310 pCi/L, respectively, at surface water sampling location SW-100, which is located in the stream directly east of the Landfill Pond. However, these results are generally ten times greater than results from other sediment sampling locations in the vicinity of these Spray Fields.

Groundwater data in the vicinity show that no organic compounds were found above the CRQL. Metals were found in ppm concentrations except for mercury, which was detected in the ppb range. Radionuclides that were found above the CRQL include gross alpha (32 pCi/L), gross beta (10 pCi/L), and uranium-233/234 (6 pCi/L). Contaminants detected in

surface water and groundwater in the vicinity of the Spray Fields are at concentrations that should not present a health hazard to personnel performing site activities.

#### 3.6.3.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, site inspection, air sampling, and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as surface soil sampling, subsurface soil sampling, sediment sampling, soil borings, groundwater sampling, and well installation. Subcontractor work activities at this site are presented in Table 7-8, Appendix B (EG&G, 1991).

#### 3.6.3.3 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental work at this site are anticipated to be possible dermal exposure or inhalation of volatile organic compounds and metals, or possible inhalation of radionuclides. The potential for this occurring is considered low based on the work activities to be performed, work practices, and the low concentration of contaminants in the surface water and low concentrations of contaminants in the groundwater.

#### 3.6.3.4 Control Measures

Pework soil screening for potential radiological hazards should be performed prior to site activities. Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for total dust and volatile organic compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedures FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will

be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

### 3.6.4 East Area Spray Field (IHSS 216.1)

#### 3.6.4.1 Site Background Summary

No previous investigations have been conducted on this IHSS; however, maximum concentrations for analytes detected in the water from Pond B-3 during 1989, when this water was being sprayed in this IHSS, have been tabulated and are presented in Table 3-4. These data provide some information on the quality of the water sprayed on the East Area Spray Field.

#### 3.6.4.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, site inspection, air sampling, and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as surface soil sampling, and subsurface soil sampling. Subcontractor work activities at this site are presented in Table 7-9, Appendix B (EG&G, 1991).

#### 3.6.4.3 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental contamination at this site are anticipated to be possible dermal exposure and inhalation of contaminated dust and volatile organic compounds or inhalation of radionuclides. The potential for this occurring is considered low based on the work activities to be performed, work practices, and low concentration of contaminants in the surface water that was sprayed on the East Area Spray Fields. The work activities at the site should not generate significant amounts of airborne dust and the concentration of contaminants at the site could be low or nonexistent. Work practice controls and real-time monitoring of the site should be stringently enforced to prevent possibility of potential worker exposure to unknown chemical or radiological hazards.

Table 3-4. Maximum Concentrations Detected in Surface Water Samples Collected in Pond B-3 in 1989

Analyte	Pond B-3
	(SW-B3)
<u>Radionuclides</u>	<u>Concentration (pCi/L)</u>
Americium-241	0.05 ± 0.01
Cesium-137	0.1 ± 0.6
Gross Alpha	3.0 ± 2.0
Gross Beta	13.0 ± 3.0
Plutonium-239	0.15 ± 0.03
Radium 226	-
Radium 228	-
Strontium 90	0.4 ± 0.4
Tritium	370.0 ± 220.0
Uranium, Total	0.2
Uranium-233/234	0.2 ± 0.2
Uranium-235	0.0 ± 0.1
Uranium-238	0.0 ± 0.2
<u>Metals</u>	<u>Concentration (mg/L)</u>
Iron	0.232
Magnesium	7.01
Manganese	0.0318
Mercury	0.0008
Selenium	NA
Strontium	NA
Zinc	0.123
Lead	NA
Beryllium	NA
Cadmium	NA
<u>Organics</u>	<u>Concentration (µg/L)</u>
Phenol	2.0

Source: Phase I RFI/RI Work Plan, EG&G, 1991



#### 3.6.4.4 Control Measures

Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for total dust and volatile organic compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedures FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

#### 3.6.5 Trenches A, B, and C (IHSS 166.1, 166.2, and 166.3)

##### 3.6.5.1 Site Background Summary

Only one previous investigation of this site has been performed. In this investigation, soil samples were collected from IHSS 166.1. Radionuclides were detected as follows: uranium-233/234 (0.87 pCi/g) and uranium-238 (0.79 pCi/g). Volatile organics (2-butanol, 1,1,1-trichloroethane, and toluene) were also detected, but concentrations are unavailable.

Some organics, including acetone, 4-methylphenol, and phenol, were found in surface water at levels above the CRQL. However, these concentrations do not exceed the ppb range. Metals such as calcium, magnesium, potassium, sodium, and lead were found in ppm concentrations. Radionuclides in concentrations above the CRQL were also discovered in the surface water. The concentrations of each contaminant are as follows: americium-241 (0.33 pCi/L), plutonium-239 (0.03 pCi/L), radium-226 (13 pCi/L), radium-228 (30 pCi/L), uranium-233/234 (22 pCi/L), uranium-238 (18 pCi/L), and total uranium (40.7 pCi/L). Gross alpha and gross beta concentrations were found at 210 pCi/L and 310 pCi/L, respectively, at surface water sampling location SW100, which is located in the stream directly east of the

Landfill Pond. However, these results are generally ten times greater than results from other sampling locations in the vicinity of these trenches.

Groundwater data for the vicinity of the trenches indicate that trichloroethene is the only organic above the CRQL, but its concentration does not exceed the ppb range. Magnesium and calcium are the only metals that were found above the CRQL. Their concentrations are in the ppm range. The following radionuclide concentrations were found in groundwater in the vicinity for the trenches: gross alpha at 9.8 pCi/L, gross beta at 3.3 pCi/L, and uranium-238 at 4.7 pCi/L. The contaminants present in groundwater in the vicinity of the trenches are at a level that should not pose a health hazard to personnel performing site activities.

#### 3.6.5.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, site inspection, geophysical surveys, air sampling and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as soil classification surveys, subsurface soil sampling, soil borings, well installation, and groundwater sampling. Subcontractor work activities at the site are summarized in Table 7-7, Appendix B (EG&G, 1991).

#### 3.6.5.3 Potential Chemical or Radiological Hazards

The primary hazard associated with site work would be potential contact with plutonium-contaminated soil. Other hazards associated with environmental activities at this site are anticipated to be possible dermal exposure or inhalation of volatile organic compounds and metals, and inhalation of radionuclides. This potential can be controlled by implementing procedures for avoiding contact with contaminated materials (i.e., PPE), and real-time air and radiological monitoring to detect potential worker contact with contaminated materials.

#### 3.6.5.4 Control Measures

Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for volatile organic compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedure FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking. Due to potential elevated concentrations of plutonium in the soil, site radiological monitoring and decontamination procedures will be strictly enforced.

#### 3.6.6 Sludge Dispersal Area (IHSS 141)

##### 3.6.6.1 Site Background Summary

Prior to 1983, all plant wastes were processed at the Sewage Treatment Plant; therefore contamination within the drying beds by a variety of chemicals, particularly plutonium, is possible. However, no previous investigations have been conducted in this IHSS and the potential contaminants present in the drying beds are unknown.

Surface water data reveal that acetone was the only organic detected above the CRQL. The acetone concentration was at the ppm level. Metals such as calcium, potassium, zinc, iron, lead, and sodium were detected above the CRQL, and these concentrations are in the ppm range. Some radionuclides were detected above the CRQL in the following concentrations: uranium-233/234 (4.7 pCi/L), uranium-238 (3 pCi/L), gross beta (40 pCi/L), and gross alpha (40 pCi/L).

Groundwater data from the vicinity of the Sludge Dispersal Area show that organics such as acetone, methylene chloride, chloroform, and trichloroethene were detected in pbb concentrations. Mercury was detected in the ppb range. Calcium, sodium, potassium, and magnesium were detected in ppm concentrations. Radionuclides detected in the groundwater are as follows: americium-241 (0.4 pCi/L), gross alpha (125 pCi/L), gross beta (87 pCi/L), plutonium-239 (0.5 pCi/L), strontium-90 (4.9 pCi/L), uranium-233/234 (25 pCi/L), uranium-235 (3.4 pCi/L), uranium-238 (20 pCi/L), and total uranium (48.4 pCi/L).

#### 3.6.6.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, site inspection, air sampling and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as subsurface soil sampling, surface soil sampling, well installation, and groundwater sampling. Subcontractor work activities at the site are summarized in Table 7-1, Appendix B (EG&G, 1991).

#### 3.6.6.3 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental activities at this site are anticipated to be possible dermal exposure or inhalation of volatile organic compounds and metals, and inhalation of radionuclides during intrusive work into the drying bed material. This potential can be controlled by implementing procedures for avoiding contact with contaminated materials (i.e., PPE), and real-time air and radiological monitoring to detect potential worker contact with contaminated materials.

#### 3.6.6.4 Control Measures

Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for volatile organic

compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedure FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking. Due to potential elevated concentrations of plutonium in the soil, site radiological monitoring and decontamination procedures will be strictly enforced.

### 3.6.7 Triangle Area (IHSS 165)

#### 3.6.7.1 Site Background Summary

Radiological contamination has been documented in several discrete locations within the Triangle Area. Records concerning the type of contamination present are not available; however, process information suggests that plutonium and americium are likely present.

Several soil investigations took place between 1969 and 1980 and soil was removed on several occasions from the area. In January 1969, due to the discovery of 29 leaking drums on the Triangle Area, radiation levels were detected as high as 200,000 dpm per 100 square centimeters (dpm/100 cm<sup>2</sup>) in adjacent soils. In 1971, leaking drums containing incinerator ash, air filters and other miscellaneous waste resulted in levels ranging between 2,000 to 200,000 dpm/100 cm<sup>2</sup> in nearby soils. In June 1973, an incident from a leaking drum containing nitric acid resulted in radiation levels of approximately 2,500 dpm/100 cm<sup>2</sup> in nearby and adjacent soils. After soil removal had been completed from this nitric acid spill, a soil sample was collected from the base of the excavation to confirm that the cleanup had been adequately performed. This sample had a reading of 24 dpm.

In June 1975, following the removal of all cargo containers of the Triangle Area, six drums of soil from previously discovered areas of anomalous radiation readings were removed. Measurements indicated that the contents of five of the drums contained less than 1 gram of plutonium each while the sixth drum contained approximately two grams of plutonium.

Radiological surveys conducted in 1975 and 1979/1980 within Triangle Area resulted in soil being removed and drummed for disposal. Soil was removed when surface counts were detected at 1,000 cpm or greater. All areas reported at or above this level were cleaned up to a level below 250 cpm (detection limit), as determined using FIDLER probe.

In addition to the soil investigations, groundwater sample analyses from the vicinity of the Triangle Area were reviewed. Organics including carbon tetrachloride, trichloroethene, acetone, and 1,2-dichloroethene were detected above the CRQL. However, these concentrations only reached the ppb range. Metals concentrations of potassium, calcium, and sodium were detected in the ppm range. Few radionuclides were detected above the CRQL. The concentrations of these radionuclides are as follows: gross alpha (71.28 pCi/L), gross beta (25.1 pCi/L), uranium-233/234 (28.36 pCi/L), and uranium-238 (21.15 pCi/L). The contaminants found in the groundwater in the vicinity of the Triangle Area are at concentrations that should not present a health hazard to personnel performing site activities.

#### 3.6.7.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, site inspection, air sampling and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as soil gas surveys, subsurface soil sampling, surface soil sampling, well installation, and groundwater sampling. Subcontractor work activities at the site are summarized in Table 7-6, Appendix B (EG&G, 1991).

#### 3.6.7.3 Potential Chemical or Radiological Hazards

The primary potential hazard associated with work at this site would be encountering past plutonium contamination in soils during intrusive activities. Other hazards associated with environmental activities at this site are anticipated to be possible dermal exposure or inhalation of volatile organic compounds and metals. This potential can be controlled by implementing procedures for avoiding contact with contaminated materials (i.e., PPE), and real-time air and radiological monitoring to detect potential worker contact with contaminated materials.

#### 3.6.7.4 Control Measures

Initial site radiological surveys and ongoing radiological surveys during site work will be strictly enforced due to the past radiological contamination. Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for volatile organic compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedure FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

#### 3.6.8 Old Outfall (IHSS 143)

##### 3.6.8.1 Site Background Summary

Soil investigations took place on several occasions near the Old Outfall. The radiological measurements listed below were taken from reports written by employees of Dow Chemical. Their calculations and assumptions have not been verified to date. The primary contaminant present is believed to be plutonium. The first report of soil contamination in the area was in May 1956, and a maximum concentration of 130 dpm per gram gross alpha was recorded. Soil samples were analyzed at the Outfall Area again in May 1958 and concentrations were reported as high as 2,000 dpm per gram gross alpha.

In April 1970, hot spots detected at the Old Outfall reported concentrations greater than 190,000 dpm per gram. In June 1971, soil samples collected between Building 771, the Old Outfall, and North Walnut Creek showed plutonium activities ranging between 60,000 and 200,000 dpm per gram.

Discharges from the Old Outfall and leaching of these discharges through the Old Outfall Area may have contributed to contamination in North Walnut Creek. This is supported by plutonium analyses of the creek's water. The average plutonium concentration in North Walnut Creek water in December 1970 was 0.4 pCi/L. The 3-month plutonium moving average in Walnut Creek was 1.1 pCi/L in December. Sediment samples collected from North Walnut Creek during the beginning of 1970 were also found to contain plutonium, ranging in concentration from 4 to 36 dpm per gram.

A soil investigation also took place in 1970 following a May 1968 incident when a broken sewer line caused the sewage lift station to overflow onto the Old Outfall Area. Radioactivity levels at the Old Outfall were recorded to be as high as 100,000 dpm per gram in this investigation. Based on these results, removal of the contaminated soil began in February 1971. During initial soil removal activities, the soil showed levels ranging between 120 and 1,300 dpm per gram. Rocks, after being completely dried, recorded levels as high as 10,000 cpm by direct instrument measurements. The area east of the initial excavation (an area of approximately 25 x 30 ft), after removal of approximately 1 ft of soil, still had soil contamination present at depth. The underlying soil was measured to have levels between 2,000 and 3,000 dpm per gram. The penetration of plutonium into the soil (>1 ft) was believed to be due to the soap and detergents discharged from the laundry holding tanks of Building 771. Soil removal activities were completed in early August 1971. The highest soil contamination level recorded during soil removal activities was 29,000 dpm per gram. Final surveys of the area following remediation showed no direct alpha count greater than 250 cpm and results averaged 34 dpm per gram with a maximum of 150 dpm per gram.

Surface water data from the vicinity of the Old Outfall indicate the presence of only one organic above the CRQL; acetone was detected in the ppm range. Metals such as calcium, potassium, sodium, and magnesium were detected in ppm concentrations. Lead was also found in ppm concentration. Radionuclide concentrations were detected in surface water as



follows: gross alpha (6 pCi/L), gross beta (4 pCi/L), total uranium (6.2 pCi/L), uranium-233/234 (3.3 pCi/L), and uranium-238 (2.9 pCi/L).

The data from nearby existing groundwater wells are not summarized because they are too far away to provide useful information.

#### 3.6.8.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, site inspection, air sampling, and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as subsurface soil sampling, surface soil sampling and fill sampling. Subcontractor work activities at the site are summarized in Table 7-4, Appendix B (EG&G, 1991).

#### 3.6.8.3 Potential Chemical or Radiological Hazards

The primary potential hazard associated with work at this site would be contact with radiologically contaminated materials during intrusive activities. Other hazards associated with environmental activities at this site are anticipated to be dermal exposure or inhalation of volatile organic compounds and metals. This potential can be controlled by implementing procedures for avoiding contact with contaminated materials (i.e., PPE), and real-time air and radiological monitoring to detect potential worker contact with contaminated materials.

#### 3.6.8.4 Control Measures

Initial site radiological surveys and ongoing radiological surveys will be strictly enforced due to previous site activities involving plutonium-contaminated soils. Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for volatile organic compounds as an indicator of potential

chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedure FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

### 3.6.9 Soil Dump Area (IHSS 156.2)

#### 3.6.9.1 Site Background Summary

Soils placed onto the Soil Dump Area reportedly contained low levels of plutonium. The volume of plutonium within these soils and concentrations are not known. A piezometer (TH-14) was installed in the northwest corner of this IHSS (exact location unknown), however, no records or completion details of this well are available. No other data from previous investigations on nearby monitoring stations were identified for this IHSS.

#### 3.6.9.2 Anticipated Work Activities

EG&G personnel may conduct nonintrusive activities such as project management, radiation survey, site inspection, air sampling and radiation monitoring activities at the site. Personnel may also participate in intrusive activities such as subsurface soil sampling, surface soil sampling, and well installation. Subcontractor work activities at the site are summarized in Table 7-4, Appendix B (EG&G, 1991).

#### 3.6.9.3 Potential Chemical or Radiological Hazards

Due to the limited amount of information available concerning this site, the potential hazards cannot be assessed accurately. It is believed that hazards such as dermal exposure or inhalation of volatile organic compounds and metals, or inhalation of radionuclides may be possible. This potential can be controlled by implementing procedures for avoiding contact with contaminated materials (i.e., PPE), and real-time air and radiological monitoring to detect potential worker contact with contaminated materials.

#### 3.6.9.4 Control Measures

Level D protection including cotton coveralls, safety boots/shoes, eye protection (as needed), and hard hats (when overhead hazards are present) will be worn during work for all nonintrusive site activities. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and chemical resistant safety boots/shoes or boot covers (as needed) will be worn during intrusive activities at the site. Monitoring for volatile organic compounds as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EMD Operating Procedure FO.16 and the applicable EMRG or ROI will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

## 4.0 HAZARD COMMUNICATION

### 4.1 INTRODUCTION

As required by the RFP Hazard Communication Program (HSPM, Section 9.07), EG&G personnel must follow established work practices to safely handle hazardous chemicals. In the HSPM, a hazardous chemical is broadly defined as "a chemical that is either a health hazard, a physical hazard or both." The implementation of a hazard communication program is also required by 29 CFR 1910.120 for RCRA treatment, storage, and disposal facilities. The EG&G Hazard Communication Program has been developed to limit the risks of personnel exposures, damage to buildings and equipment, and the unplanned release of hazardous chemicals to the environment due to normal operations. The program includes protocols to assess the hazards associated with chemicals on site; inventory and labeling of chemicals; communication training; acquisition, transportation, and handling of chemicals; and emergency response to releases of chemicals.

The requirements of this program apply to EG&G personnel working at OU6 in the event that they need to store hazardous chemicals such as calibration gases or radiological calibration sources for field monitoring equipment, fuel, caustic compounds for sample preservation, or solvents for equipment decontamination on the site. Hazardous chemicals present as contaminants at hazardous waste sites are exempt from the Hazard Communication Program Requirements.

Subcontractors must also implement a hazard communication program for their employees working at RFP. As part of the program, they must maintain an inventory of hazardous chemicals stored onsite, and Material Safety Data Sheets (MSDS) for these chemicals must be available to employees at the site.

### 4.2 HAZARDOUS MATERIALS INVENTORY

The EG&G Industrial Hygiene Department coordinates the inventory of hazardous chemicals used or stored at the plant. The inventory is used for reporting and emergency response purposes.

If EG&G personnel need to store hazardous chemicals at OU6 or in the subcontractor trailer area, an inventory of these chemicals must be forwarded to the Industrial Hygiene Department. Data contained in the inventory is to include the name, quantity, and location of the chemical as well as the name and department of the chemical's owner.

Subcontractors must also compile an inventory of hazardous chemicals present at their work sites or trailer areas and provide this information to EG&G. The inventory may be requested by emergency response personnel to aid in identifying hazards associated with a spill or accident at the site. Radiological check sources and/or reference sources must also be included in this inventory including applicable calibration certificates.

#### 4.3 MATERIAL SAFETY DATA SHEETS

The MSDS must be readily available to employees for hazardous chemicals used or stored at the site. Information found on a MSDS includes identification of the product's hazardous chemical constituents, its physical characteristics, applicable exposure limits, symptoms of overexposure, recommended PPE, fire and explosion hazards, and spill response actions. This information is provided by the manufacturer and is typically included with the shipment of the chemical. The Industrial Hygiene Department maintains a master file of MSDS for materials stored or used at the plant. A complete file of MSDS for hazardous chemicals used at OU6 must be kept at the site field office and readily available to site employees.

#### 4.4 TRAINING

EG&G personnel are required to complete Hazard Communication Program training. The course is a computer-based training (CBT) program designed to familiarize employees with the Hazard Communication Program. The course includes a summary of applicable federal regulations and EG&G policies related to hazard communication, hazardous materials evaluation responsibilities within the plant, chemical labeling, MSDS, and sources of hazard information. The course is approximately 1 hour in length and is required every 2 years. A course outline is provided in

Table 4-1. Specific training on the information provided in the MSDS is to be conducted by the subcontractor Health and Safety Officer, or the Industrial Hygiene Representative.

#### Table 4-1 Hazard Communication Program Training Course Outline

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##### Course content:

- OSHA, DOE, and RFP standards and policies on hazard communication
- Hazardous material evaluation responsibilities
- The warning labels used at RFP
- MSDS
- How to obtain hazard information.

##### Course objectives are to train the employee to:

- Describe the OSHA, DOE, and RFP hazard communication policies
  - Identify the agencies responsible for hazardous material evaluation
  - Interpret a RFP warning label
  - Describe the contents and uses of MSDS
  - List several different sources from which to obtain hazard information.
-

## 5.0 SITE CONTROL

### 5.1 OBJECTIVES

The purpose of this site control plan is to protect workers, the public, and the environment from the potential hazards associated with the OU6 RFI/RI work. The terms "site control" and "controlled" versus "uncontrolled" are used in this section in the context of hazardous waste sites. This OSHA terminology does not necessarily apply to formal radiological definitions used in RFP production facilities.

In addition to site general control measures required under the 29 CFR 1910.120, activities conducted at OU6 shall be conducted in accordance with the EG&G Integrated Work Control Program (IWCP). Subcontractors and EG&G personnel will adhere to requirements of the IWCP. A radiation work permit may also be required as part of the IWCP in areas where suspected radionuclides exist. Information required for the radiation work permit includes job information, description of hazards, radiological and nonradiological safety requirements, preparation for the job, approval signatures, and permit duration. A copy of the radiation work permit is included as Figure 5-1.

### 5.2 SITE CONTROL DESIGNATIONS

Two site control designations are used for potentially hazardous locations at OU6. The work location itself is designated as an Exclusion Zone (EZ) and the staging area outside a work location is designated as a Contaminant Reduction Zone (CRZ). Access to these areas will be controlled. Personnel working in the areas must meet specific training requirements, be participants in a medical surveillance program, and don required PPE. Minimum requirements for access to these designated areas are summarized below. Detailed PPE, training, and decontamination requirements are presented in the respective sections of this SSHSP.

#### 5.2.1 Exclusion Zone

During investigative activities at OU6, EG&G or subcontractor personnel conducting work at the site will establish an EZ. An entire IHSS may be designated as an EZ during investigations if



**Figure 5-1  
Radiation Work Permit**

<b>RADIATION WORK PERMIT</b> Rocky Flats Plant		NO: _____ Date: _____
<input type="checkbox"/> EXTENDED		
Specific Task of Operation _____		W/O PROCEDURE# _____
Location: Bldg. Rm. _____	Supervisor: Phone _____	RWP Starts _____ RWP Ends _____
Area: _____	Name: _____	Date: _____ Date: _____
	Empl # _____	Time: _____ Time: _____
<b>REQUIREMENTS</b>		
<b>Protective Clothing</b> _____ Inspection Only _____ Coveralls _____ Shoe Covers _____ Surgeon Gloves _____ pair _____ Anti-C Coveralls _____ Wet Suit _____ Plastic Booties _____ Rubber Boots _____ Hood _____ type _____ Work Gloves _____ type _____ Tape Openings _____ Other	<b>Respiratory</b> _____ Full Face, Particulate _____ Full Face, Airline _____ Supplied Air Suite _____ Portable SAAM _____ Lapel Air Sample	<b>Dosimetry</b> _____ XX _____ TLD _____ SRD _____ EXT _____ Other _____ Pre/Post _____ Bioassay DO NOT EXCEED _____ mRem/RWP
	<b>Containment</b> _____ Pen _____ Tent _____ Point Source _____ Air Mover _____ HEPA Vacuum	<b>Rad Ops Coverage</b> _____ Full _____ Start _____ Oncall _____ None
	<b>ALAR REVIEW REQUIRED</b> _____ Y _____ N _____	<b>Rad Eng</b> _____ Y _____ N Name: _____ Phone: _____
Comments _____		
Smear Type: A BG _____ <b>SURVEYS</b> _____ Freq: S D W M R O NA Pre/Post/Dur _____		
Removable Fixed mR/hr G mRem/hr N mRem/hr @ 1m N/G Ratio	_____	_____
RPT Name	_____	_____
Employee #	_____	_____
Date	_____	_____
Time	_____	_____
RO Foreman	_____	_____
Employee #	_____	_____
Original -- Post at work site (Return to RAD Engineering at Termination) Copy -- RWP Master File Copy -- Rad Building Engineer RF 4738 (1/81)		

necessary. As a minimum, individual work areas (drill sites, excavation sites, sample areas, etc.) inside of the IHSS will be designated as an EZ. The limits of these zones and the PPE requirements within the zones will be based on the hazards of the work being conducted, as determined by the appropriate health and safety representative. Environmental samples collected at these sites may contain elevated levels of radiological and/or chemical contaminants. Personnel entering these areas will be required to wear appropriate PPE. When leaving these areas, decontamination procedures (described in Section 7.0) will be followed where required including clearance by RPTs or approved subcontractor health and safety personnel (when working at subcontractor sites).

In addition, radiation site control measures may be implemented by Radiological Engineering in OU6. The site control designations are a "controlled area" and a "contaminated area." This classification is based on the activity or procedure to be performed and/or the level of possible exposure/contamination to the worker.

Radiation site control designations include the following:

- **Controlled Area:** A "controlled area" is designated when the contamination levels are below established standards, but radiological precautions may be necessary to alert workers of potential hazards.
- **Contaminated Area:** A "contaminated area" shall be designated when contamination is elevated above permissible levels. When elevated levels occur, the controlled area is also posted as a contaminated area. All contamination levels shall be maintained within acceptable limits by using appropriate control methods and kept as low as reasonably achievable (ALARA). All contaminated waste shall be properly contained and identified.

### 5.2.2 Contaminant Reduction Zone

Adjacent to the site- or task-specific EZ will be the CRZ, where appropriate measures will be in effect to reduce the potential for spreading contamination via the workers and equipment. The entrance, exit, and decontamination area adjacent to the EZ will be designated as a CRZ. All personnel conducting or supervising activities in this area are required to have appropriate training.

### 5.2.3 Support Zone

The Support Zone will be outside the CRZ and will be the area where support workers will provide assistance to workers inside the EZ and CRZ. The Support Zone will begin at the exit from the decontamination line. Only clean or appropriately containerized equipment or material should exit into the support zone from the CRZ. Visitors and observers will comply with the site control designations and the zone requirements established at the work site. Visitors will not be allowed to enter the EZ and/or CRZ without training as required in Section 10.0 of this SSHSP.

## 5.3 GENERAL OPERATING PROCEDURES

Standard safety guidelines for site personnel are outlined in the EG&G HSPM. Specific requirements applicable to personnel at OU6, including a description of the site communication system and the requirements of the buddy system, are described in this section.

Personnel will not conduct work activities at OU6 alone. They will be accompanied by either another EG&G employee or subcontractor employee. The buddy system, as specified in 29 CFR 1910.120 (d)(3), will be implemented at the site. The buddy teams working at the site will maintain visual and audible contact so that they can provide emergency assistance to each other, if needed. Both members of the buddy team need not be in the same site zone, but each member must be wearing adequate PPE to assist the other, if necessary.

The communication system at the site consists of telephones and hand-held radios. EG&G personnel will have access to telephones in the subcontractor trailer area, and when at OU6, they will rely on the hand-held radio system used by subcontractors performing the investigative work.

## 5.4 PLAN FOR PREVENTION OF CONTAMINANT DISPERSION

### 5.4.1 Objective

The objective of the Plan for Prevention of Contaminant Dispersion (PPCD) is to establish procedural requirements to mitigate potential hazards to the general public as a result of contact with emissions resulting from intrusive remedial investigation activities.

#### 5.4.2 Scope

Procedural requirements identified herein are applicable to intrusive actions conducted at work sites as part of the RFI/RI activities described in the IAG. Intrusive activities that fall within the scope of this PPCD are those with the potential for producing appreciable suspended particulate, primarily through mechanical actions. Intrusive activities susceptible to producing appreciable quantities of suspended particulate include:

- Monitor well and soil/rock borehole installation
- Excavations (such as trenching and test pitting) using powered equipment.

Additionally, heavy vehicular traffic associated with RFI/RI activities will be considered susceptible to producing appreciable quantities of suspended particulate. By contrast, activities such as surface soil sampling with hand implements may not be considered susceptible to producing appreciable quantities of suspended particulate.

Procedural requirements identified herein must be evaluated on a case-by-case basis to determine their potential impact on other IAG objectives. For example, it is possible that applying certain dispersion techniques, such as wetting, could compromise sample integrity and limit the usefulness of the data for which the sampling was intended.

#### 5.4.3 Responsibility

The EG&G RFI/RI PM will be responsible for assuring that activities conducted at OU6 are performed in accordance with the requirements identified herein.

#### 5.4.4 Procedural Requirements

The PM and Activity Field Supervisor will conduct a pre-startup activity review to evaluate the potential for particulate emissions to create hazardous conditions. If the activity is being performed by non-EG&G personnel, the subcontractor's Activity Field Supervisor will participate in the review.

If the review establishes that there is a significant potential for producing appreciable quantities of suspended particulates that could create hazardous conditions, the specific procedural requirements identified below will govern the activity.

#### 5.4.4.1 Specific Requirements

Activities in which there is a significant potential for producing appreciable quantities of suspended particulates will not be conducted when the following conditions exist:

- Sustained wind speeds above 15 miles per hour (mph), as measured by a site-located anemometer. Sustained winds above 15 mph exist when the 15-minute average wind speed exceeds 15 mph for two consecutive 15-minute periods.
- Soil moisture content less than 15 percent in areas where major excavation or scraping is planned, as measured with a "Speedy Moisture Tester" or equivalent instrument.

In the special case of excavations, the top 6 inches of soil will be moved (i.e., scraped), placed in a low pile, and covered with a tarp or other suitable covering to prevent resuspension of particulates. The width of the scraped zone will be wide enough to accommodate the expected volume of soil from the excavation, without coming into contact with unexcavated adjacent surface soil.

Air quality monitoring requirements for activities in which there is a significant potential for producing appreciable quantities of suspended particulate include the following:

- Site perimeter and community Radiological Ambient Air Monitoring Program monitoring.
- Local monitoring of Total Suspended Particulate (TSP) at individual activity work sites will be conducted using a real-time total dust monitor. Local TSP measurements will be used to guide the Project Managers evaluation of the potential hazards associated with activity-related emissions. The threshold TSP concentration for curtailing intrusive activities will be in accordance with Table 5-1 (TSP action levels for potential chemical hazards are discussed in Section 9.0).
- Additional worker health and safety monitoring as required by the SSHSP.

Table 5-1  
Local Air Monitoring Trigger Levels for Plutonium-239 in Soils

Soil Activity (pCi/g)	1.8 Rem/yr TSP (mg/m <sup>3</sup> )	DAC/10 TSP (mg/m <sup>3</sup> )
0.001	1,060,500	200,000
0.01	106,050	20,000
0.1	10,605	2,000
1	1,061	200
5	212	40
10	106	20
20	53	10
40	27	5
60	18	3
80	13	3
100	11	2
200	5	1
400	3	0.5
600	2	0.3
800	1.3	0.3
1,000	1.1	0.2
1,500	0.7	0.13
2,000	0.5	0.10
5,000	0.2	0.04
10,000	0.1	0.02
20,000	0.05	0.01
50,000	0.02	0.004
80,000	0.013	0.003
1000,000	0.011	0.002

Trigger levels are for TSP matter concentrations measured in the breathing zone as 8-hour, time-weighted averages. They are based on (1) the Derived Air Concentration (DAC)/10, which DOE recognizes as the criteria for implementing respiratory protection and (2) the RFP ALARA-based recommended annual committed effective dose equivalent of 1.8 Rem/year.

mg/m<sup>3</sup> = milligrams per cubic meter

Table 5-1  
Local Air Monitoring Trigger Levels for Plutonium-239 in Soils

Use of This Table

1. Identify the approximate soil activity in the area where intrusive activities are to be conducted.
2. Identify the corresponding DAC/10 and annual committed effective dose equivalent (i.e., 1.8 Rem/year) trigger levels. Those values represent TSP concentration that trigger the following actions:
  - a. Donning respiratory protection equipment: DAC/10 threshold
  - b. Stop intrusive actions and re-evaluate the activities, conditions, and precautionary requirements
3. Measure TSP breathing zone concentrations during intrusive activities using a Piezometric Balance, Mini-Ram, or comparable real-time instrument.
4. If the measured TSP concentrations attain the trigger levels identified above, for a sustained period of time (15-30 minutes), such that the 8-hour time-weighted average could be approached, follow the appropriate requirements identified above (A or B) and notify the Site Health and Safety Coordinator or subcontractor Health and Safety Officer.
5. RFP ALARA practice dictates that reasonable measures be taken to keep exposures to radionuclides as low as reasonably achievable. This implies that routine dust control measures, such as local wetting, and exposure control mechanisms, such as avoiding the leeward dust plume path, should be considered to the extent practical, regardless of the TSP measurements.
6. Environmental concentration measurements and estimates embody uncertainties and can vary at a given location. Thus, users of this table are encouraged to exercise conservative judgment regarding the selection of trigger levels.

Additional requirements that govern activities in which there is a significant potential for producing appreciable quantities of suspended particulates that could create hazardous conditions will include the following:

- Excavated soils that are not promptly backfilled will be covered by a tarp or similar cover to prevent resuspension of particulates.
- Vehicular traffic will be minimized to the extent practicable.
- Vehicular traffic will not exceed 5 mph.
- Roadways will be watered as necessary.
- Access paths leading to activity sites that are not on roadways will be watered to prevent generation of particulates from vehicular traffic during access and egress.

Activity-specific requirements will be evaluated periodically to determine their effectiveness in preventing dispersion of contaminants. Modifications to these requirements will be documented as a change to the SSHSP.



## 6.0 PERSONAL PROTECTIVE EQUIPMENT

### 6.1 INTRODUCTION

Standard procedures for selection, inspection, and use of PPE at OU6 are addressed in this section. The criteria used to determine appropriate levels of protective equipment include evaluation of the task being performed; potential chemical, radiological, and mechanical hazards at the site; monitoring data; effectiveness of engineering controls; and applicable regulations.

A number of federal agencies dictate the need for PPE at hazardous waste sites. Among these agencies are OSHA, EPA, and DOE. Table 6-1 lists the specific OSHA standards that impact the manufacture, selection, and use of PPE.

All subcontractors are required to evaluate the hazards of the tasks they are to perform and establish adequate PPE levels to protect their employees. At a minimum, EG&G personnel requiring access into an EZ or CRZ will follow subcontractor PPE requirements.

A site control plan has been developed to limit access of personnel to OU6 (Section 5.0). In addition, specific historical disposal sites designated in the IAG as IHSS have been identified at OU6. Because of unique hazards associated with defined tasks, several subcontractors may perform tasks concurrently within an IHSS and require different zoning and PPE.

The actual selection of PPE is a complex matter that must be evaluated by the Industrial Safety, Industrial Hygiene, and Radiological Engineering as coordinated by the Radiation Protection Area Manager. At a minimum, Level D PPE, including safety shoes, Class I eye protection with side shields, and a hard hat (when overhead hazards are present) is required for anyone performing investigation activities at OU6 sites.

Table 6-1  
Occupational Safety and Health Administration Standards  
for Use of Personal Protective Equipment

Type of Protection	Regulation	Source
General	29 CFR Part 1910.132 General Requirements for Personal Protective Equipment	41 CFR Part 50-204.7
	29 CFR Part 1910.1000 29 CFR Part 1910.1001-1045	OSHA Rulemaking OSHA Rulemaking
Eye & Face	29 CFR Part 1910.133 (a)	ANSI Z87.1-1968 <sup>a</sup> Eye & Face Protection
Noise Exposure	29 CFR Part 1910.95	41 CFR Part 50-204.10 & OSHA Rulemaking
Respiratory	29 CFR Part 1910.134	ANSI Z88.2-1969 <sup>a</sup> Standard Practice for Respiratory Protection
Head	29 CFR Part 1910.135	ANSI Z89.1-1969 <sup>a</sup> Safety Requirements for Industrial Head Protection
Foot	29 CFR Part 1910.136	ANSI Z41.1-1967 <sup>a</sup> Men's Safety Toe Footwear

<sup>a</sup>American National Standards Institute (ANSI), 1430 Broadway, New York, NY 10018. ANSI regularly updates its standards. The ANSI standards in this table are those that OSHA adopted in 1971. Since these ANSI standards had been set in 1967-1969, those standards now required under OSHA may be less stringent than the most recent standards.

## 6.2 GENERAL APPLICATION OF PERSONAL PROTECTIVE EQUIPMENT

The use of PPE is required when engineering and administrative controls are insufficient to prevent worker exposures to hazardous chemical and radioactive materials. Due to the nature of work performed at OU6, there is a potential for release of vapors and particulates that cannot be completely controlled at the source. Engineering and administrative controls will be used, when appropriate, to minimize potential exposures; however, the use of PPE may be necessary in maintaining exposure ALARA.

## 6.3 PERSONAL PROTECTIVE EQUIPMENT ISSUES APPLICABLE TO ALL SITE PERSONNEL

All personnel assigned to OU6 must be trained in the proper inspection and use of PPE before beginning work on the site. For workers required to wear respiratory protection, this training requirement is fulfilled through completion of the 40-hour OSHA course discussed in Section 10.0, "Training," and completion of the CBT module on Respiratory Protection. All OU6 personnel required to wear a respirator must be medically cleared and fit tested at least annually, in accordance with EG&G protocols. Use of a self-contained breathing apparatus or airline respirator requires additional training prior to use.

All personnel assigned to OU6 must have a current medical clearance issued by a qualified physician for work at a hazardous waste site. This clearance will be updated annually with the employee's physical exam as described in Section 8.0 of this SSHSP.

Workers required to use PPE must do so in buddy teams. The team members are responsible for inspecting each others' equipment during donning and field use. Inspection checklists are presented in Table 6-2.

Workers experiencing any unusual symptoms of fatigue, dizziness, high body temperature, skin or respiratory irritation, or suspected overexposure should immediately withdraw from the work area and proceed through decontamination. The employee should then notify his/her supervisor,

Table 6-2  
General Personal Protective Equipment Inspection Checklists<sup>1</sup>

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## CLOTHING

### Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
  - imperfect seams
  - non-uniform coatings
  - tears
  - malfunctioning closures
- Hold up to light and check for pinholes.
- Flex product:
  - observe for cracks
  - observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical degradation:
  - discoloration
  - swelling
  - stiffness

### During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects, including:
  - closure failure
  - tears
  - punctures
  - seam discontinuities

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<sup>1</sup> Specific procedures recommended by equipment manufacturers should be followed.

Table 6-2  
General Personal Protective Equipment Inspection Checklists<sup>1</sup>

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## RESPIRATORS

### Self Contained Breathing Apparatus

- Inspect air supply/cascade system:
  - before and after each use
  - at least monthly when in storage
  - every time they are cleaned
- Check all connections for tightness.
- Check material conditions for:
  - pliability
  - signs of deterioration
  - signs of distortion
- Check for proper setting and operation of regulators and valves (according to manufacturers' recommendations).
- Check operation of alarm(s).
- Check face mask and lenses for:
  - cracks
  - crazing
  - fogginess

### Supplied-Air Respirators

- Inspect Supplied Air Respirators:
  - daily when in use
  - at least monthly when in storage
  - every time they are cleaned
- Inspect air lines prior to each use for cracks, kinks, cuts, frays, and weak areas.
- Check for proper setting and operation of regulators and valves (according to manufacturers' recommendations).

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<sup>1</sup> Specific procedures recommended by equipment manufacturers should be followed.

Table 6-2  
General Personal Protective Equipment Inspection Checklists<sup>1</sup>

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**RESPIRATORS (cont.)**

- Check all connections for tightness.
- Check material conditions for:
  - signs of pliability
  - signs of deterioration
  - signs of distortion
- Check face mask and lenses for:
  - cracks
  - crazing
  - fogginess

**Air-Purifying Respirators**

- Inspect air-purifying respirators:
  - before each use
  - after each use
  - (before using a newly supplied respirator ensure that the storage bag is sealed)
- Check mask for:
  - pliability
  - signs of deterioration
  - distortion
  - missing or broken parts
- Examine cartridges or canisters to ensure that they are the proper type for the intended use.
- Check face shields and lenses for:
  - cracks
  - crazing
  - fogginess
- Perform positive and negative pressure fit tests prior to use.

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<sup>1</sup> Specific procedures recommended by equipment manufacturers should be followed.

and the incident should be reported immediately by the supervisor to the Occupational Health Department and the SHSC or subcontractor HSO as appropriate.

Table 6-3 lists the protective clothing ensembles for C and D levels of protection, as defined in the National Institute of Occupational Safety and Health (NIOSH) document, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities." The table also lists the level of protection provided, criteria for when the protective equipment should be used, and the limiting factors of the respective protective equipment.

#### 6.4 PPE REQUIREMENTS FOR ON-SITE SPILL CLEANUP

The PPE requirements for spill cleanup crews are designated as Level C protective clothing and will include the following:

- Cotton coveralls (EG&G-furnished gray coveralls)
- Impervious Tyvek coveralls with hoods and boots
- Safety shoes
- Impervious plastic boot covers (taped to Tyvek coveralls)
- Cotton booties (over boot covers)
- Respiratory protection (air purifying, with appropriate cartridge)
- Cotton hood (taped in place)
- Viton gloves (or gloves with equivalent permeation resistance) over surgical gloves for wet product handling and a minimum of double surgical gloves for dry product handling.

Level B or Level A PPE may be required, depending on conditions.

Table 6-3  
Protective Ensembles<sup>1</sup>

Level of Protection	Equipment	Protection Provided	Should Be Used When:	Limiting Criteria
C	<p><b>RECOMMENDED:</b></p> <ul style="list-style-type: none"> <li>• Full-facepiece, air-purifying, canister-equipped respirator</li> <li>• Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit).</li> <li>• Inner and outer chemical-resistant gloves</li> <li>• Chemical-resistant safety boots/shoes</li> <li>• Hard hat</li> <li>• Two-way radio communications</li> </ul> <p><b>OPTIONAL:</b></p> <ul style="list-style-type: none"> <li>• Coveralls</li> <li>• Disposable boot covers</li> <li>• Face shield</li> <li>• Escape mask</li> <li>• Long cotton underwear</li> </ul>	The same level of skin protection as Level B, but a lower level of respiratory protection	<ul style="list-style-type: none"> <li>• The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin</li> <li>• The types of air contaminants have been identified, concentrations measured, and a canister is available that can remove the contaminant</li> <li>• All criteria for the use of air-purifying respirators are met</li> </ul>	<ul style="list-style-type: none"> <li>• Atmospheric concentration of chemicals must not exceed IDLH levels</li> <li>• The atmosphere must contain at least 19.5 percent oxygen</li> </ul>
D	<p><b>RECOMMENDED:</b></p> <ul style="list-style-type: none"> <li>• Coveralls</li> <li>• Safety boots/shoes</li> <li>• Safety glasses or chemical splash goggles</li> <li>• Hard hat</li> </ul> <p><b>OPTIONAL:</b></p> <ul style="list-style-type: none"> <li>• Gloves</li> <li>• Escape mask</li> <li>• Face shield</li> </ul>	No respiratory protection, minimal skin protection	<ul style="list-style-type: none"> <li>• The atmosphere contains no known hazard</li> <li>• Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals</li> </ul>	<ul style="list-style-type: none"> <li>• This level should not be worn in the Exclusion Zone</li> <li>• The atmosphere must contain at least 19.5 percent oxygen</li> </ul>

IDLH = Immediately dangerous to life or health

<sup>1</sup> From "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, 1985.

- Level A or B PPE ensembles are not listed here because it is not anticipated that Level A or B will be required during site activities.



## 6.5 REUSE OF PERSONAL PROTECTIVE EQUIPMENT

Tyvek coveralls may be used for the duration of a work period. However, they should be removed and disposed during decontamination whenever a worker leaves the EZ or CRZ.

Respirators should be wiped clean by site personnel as they are removed. They must be stored in a plastic bag, with the cartridge side down, so that the facepiece is not distorted.

Reuse of respirators is permitted, provided the cartridges are not saturated with moisture, breathing resistance is not excessive, and chemical odors are not detected. The following information should serve as a guide for respirator replacement:

- Personnel required to use respirators frequently (i.e., more than a few times per month) should replace respirators at least on a monthly basis
- Personnel who are moderate/medium respirator users (i.e., few times per month) should replace respirators at least every 3 months
- Infrequent or occasional respirator users should replace respirators at least every 6 months.

Workers are not authorized to change cartridges. Respirators must be sent back to the Laundry, Building 778, upon completion of use.

Subcontractor-supplied respirators will be cleaned, stored, and replaced in accordance with the EG&G approved subcontractor respiratory protection program procedures.

## 7.0 DECONTAMINATION

### 7.1 INTRODUCTION

The objective of decontamination is to remove hazardous substances from workers and equipment, to assure compliance with DOE Order 5480.11 and OSHA Standard 29 CFR 1910.120, and to prevent potential adverse health effects that could be caused by contact with hazardous materials. Decontamination requirements and procedures at OU6 will vary according to the task and the hazardous materials encountered. It is not expected that EG&G employees will directly handle hazardous waste materials during the initial phases of the remedial activities at this site. The anticipated activities of EG&G employees may include project management, site inspections, air monitoring for chemical and radiological contaminants, and radiological monitoring of personnel and equipment leaving the site. The majority of this work will be conducted outside of the EZ in either the CRZ or the Support Zone, where only minimal or no decontamination will be required. In the event that decontamination of EG&G personnel or equipment is required, it is expected that they will use the decontamination equipment provided by the subcontractor performing the investigation work and will follow the approved decontamination procedures that the subcontractor has established.

### 7.2 DECONTAMINATION PROCEDURES

#### 7.2.1 Personnel and Small Equipment Decontamination

Decontamination procedures for the various phases of work at OU6 will be determined by the hazardous materials present at each site. The hazardous materials known to be present thus far include organic solvents, metals, and radionuclides. It is the responsibility of the EG&G Radiological Operations and Radiological Engineering Representatives assigned to the site to determine whether radiological contamination of personnel or equipment exists and to prescribe the decontamination procedures that will be required. The persons to contact for radiological assistance are identified in Section 2.0 (Responsibilities) of this SSHSP. The requirements for chemical decontamination will depend on the type of chemical present. An outline of the general procedure for decontamination for personnel performing work at Levels C and D are outlined in Figures 7-1 and 7-2, and Tables 7-1 and 7-2. Safe work practices are to

# Decontamination Station Level C

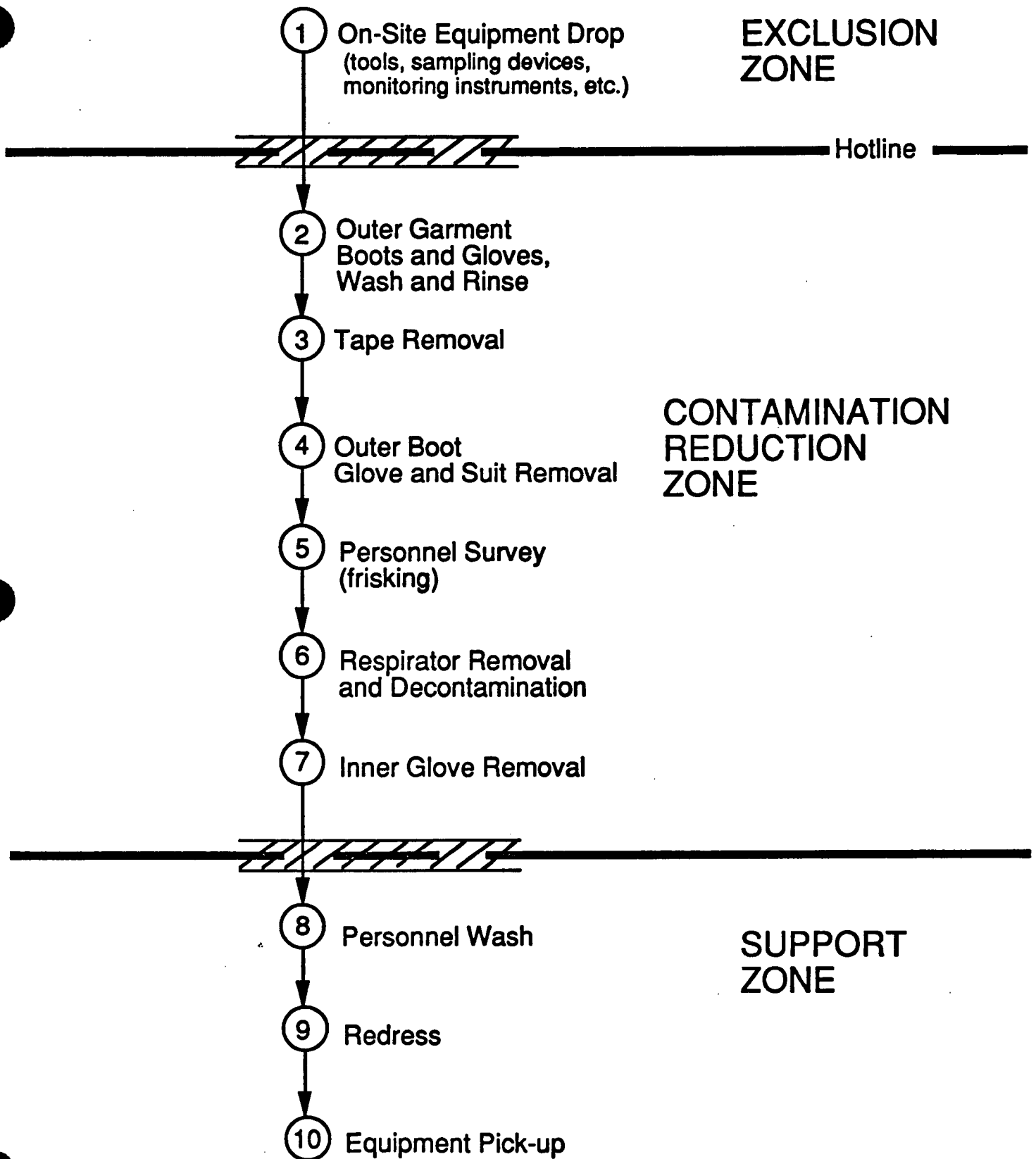


Figure 7-1

# Decontamination Station Level D

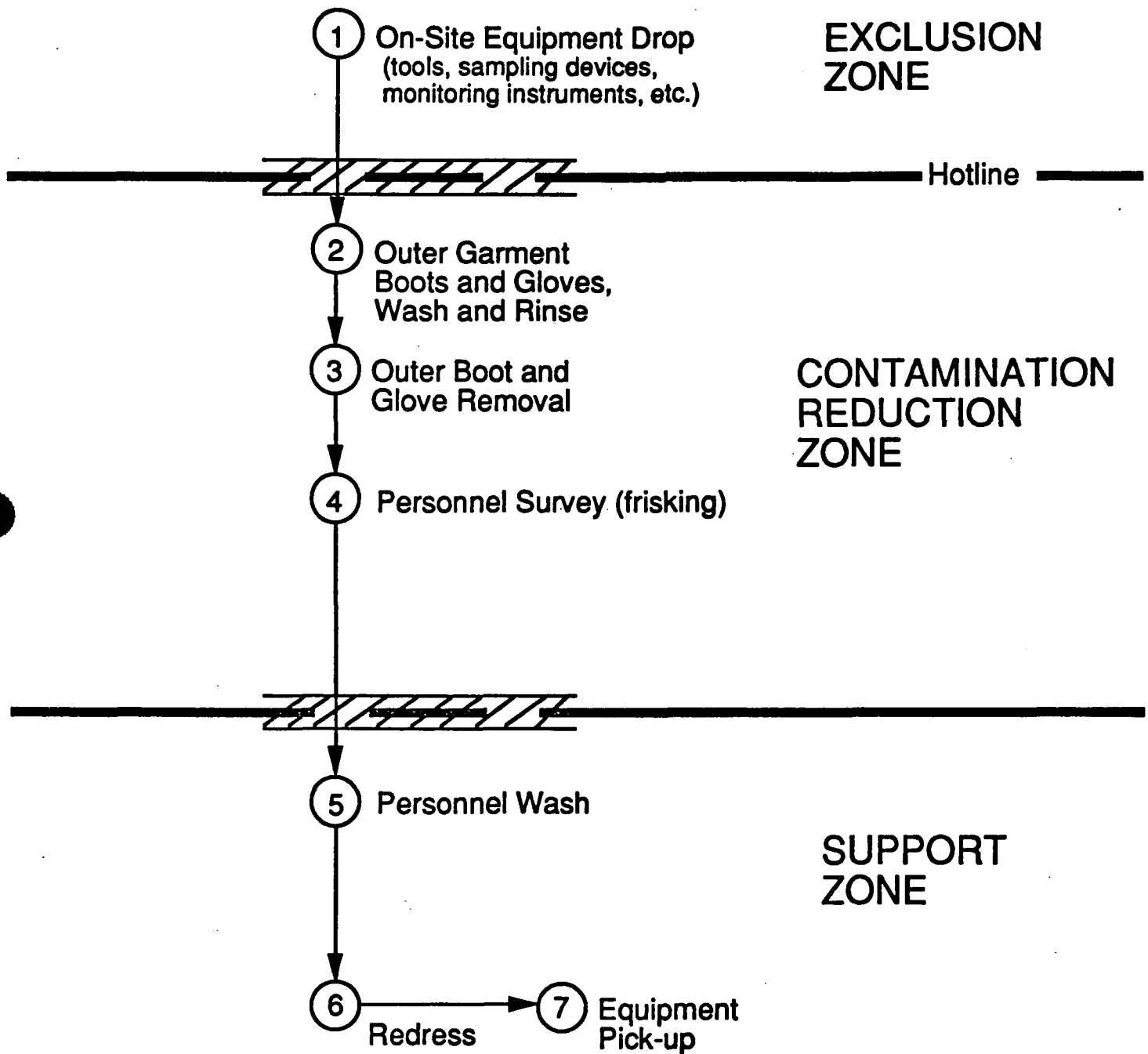


Figure 7-2

## LEVEL C DECONTAMINATION PROCEDURE

Activity	Procedure	Items Suggested
1. Equipment drop	Drop equipment (hard hats, tools, samples, etc.) on plastic labeled, "EQUIP." Decon Tech will decon equipment.	1. Plastic sheet (10' x 10') labeled, "EQUIP"
2. Glove and boot wash/rinse *	Enter "HOT" side of decon zone. Wash/rinse gloves and boots by spraying with detergent solution and rinse solution while standing in appropriate tubs. Scrub as needed.	1. Plastic sheet (15' x 30') divided in half and labeled "HOT" and "COLD." 2. Wash tubs (2) 3. Pump sprayer (2) 4. Detergent 5. Scrub brush 6. Duct tape 7. Trash can
3. Tape Removal	Remove tape from wrists, facepiece, and boots.	
4. Outer boot, glove and suite removal	Remove outer boots, gloves, and suit with inside out method. Drop into "CONTAMINATED" trash can.	
5. Personnel Survey (frisking)	Place the survey instrument probe within 1/2" of the body surface and move gradually to check the body. A rate of 1 to 2 inches per second is considered acceptable.	
6. Respirator removal and decontamination	Hand respirator to Decon Tech for decon.	
7. Inner glove removal	Remove inner gloves.	
8. Personnel wash	Wash/rinse face and hands in wash basin. Use hand cleaner, if preferred.	1. Wash basin 2. Paper towels 3. Portable shower 4. Soap 5. Hand cleaner
9. Redress	Change into street clothes.	
10. Equipment pick-up	Equipment deconned by Decon Tech may be picked up.	

\* This step may be omitted if disposable outer garments are worn.  
Proceed directly to step 3.

Table 7-2

## LEVEL D DECONTAMINATION PROCEDURE

Activity	Procedure	Items Suggested
1. Equipment drop	Drop equipment (hard hats, tools, samples, etc.) on plastic labeled, "EQUIP." Decon Tech will decon equipment.	1. Plastic sheet (10' x 10') labeled, "EQUIP"
2. Glove and boot wash/rinse *	Enter "HOT" side of decon zone. Wash/rinse gloves and boots by spraying with detergent solution and rinse solution while standing in appropriate tubs. Scrub as needed.	1. Plastic sheet (15' x 30') divided in half and labeled "HOT" and "COLD." 2. Wash tubs (2) 3. Pump sprayer (2) 4. Detergent 5. Scrub brush 6. Duct tape 7. Trash can
3. Outer boot and glove removal	Remove gloves and suit with inside-out method. Drop into "CONTAMINATED" trash can.	
4. Personnel survey (frisking)	Place the survey instrument probe within 1/4" of the body surface and move gradually to check the body. A rate of 1 to 2 inches per second is considered acceptable.	
5. Personnel wash	Wash/rinse face and hands in wash basin. Use hand cleaner, if preferred.	1. Wash basin 2. Paper towels 3. Portable shower 4. Soap 5. Hand cleaner
6. Redress	Change into street clothes.	
7. Equipment pick-up	Equipment deconned by Decon Tech may be picked up.	

\*This step may be omitted if disposable outer garments are worn.  
Proceed directly to step 3.

Table 7-2

be exercised at all times to prevent or minimize personnel and equipment contamination. Appropriate PPE will be used during decontamination operations as an additional measure to prevent direct employee exposure to hazardous substances.

Current EMD Operating Procedures should be consulted for specific decontamination requirements. These procedures include EMD Operating Procedure FO.03 - General Equipment Decontamination; EMD Operating Procedure FO.06 - Handling of Personal Protective Equipment; and EMD Operating Procedure FO.07 - Handling of Decontamination Water and Wash Water.

#### 7.2.2 Heavy Equipment Decontamination

It is not anticipated that EG&G will be providing or operating heavy equipment such as backhoes, graders, front-end loaders, etc., at OU6. Any such heavy equipment used by subcontractors at the site must be checked for contamination and decontaminated (if necessary) prior to leaving the area. Each subcontractor will be responsible for submitting a monitoring and decontamination plan for their equipment to EG&G for approval prior to starting work. Typical decontamination procedures used within the facility include:

Large pieces of equipment such as backhoes will be frisked with radiation survey instruments and smeared as needed to meet radiological decontamination standards. Such equipment should be rinsed with clean water and/or steam and inspected by the RPT or subcontractor HSO prior to being transferred from the site. Equipment leaving the Controlled Area shall be monitored as stipulated in HSPM 18.12, ROI 3.1, or EMRG 3.1 prior to release.

Refer to the EMD Operating Procedure to FO.04 - Heavy Equipment Decontamination for specific guidance.

## 8.0 MEDICAL SURVEILLANCE

### 8.1 INTRODUCTION

The medical surveillance requirements of OSHA Standard 29 CFR 1910.120(f) provides the framework for a medical monitoring program of workers involved in hazardous waste operations and emergency response. The standard includes provisions for baseline, periodic, and termination medical examinations to monitor for potential exposures to hazardous materials and conditions.

The Occupational Health Department, under the direction of the Occupational Health Director, is responsible for the RFP Medical Surveillance Program. The Medical Surveillance Program is designed to detect early signs of adverse health effects from chemical, radiological, and physical hazards at RFP and to facilitate protective measures.

The Occupational Health Department provides comprehensive physical examinations to EG&G employees at no cost to the employee and without loss of pay. The exam results are used to assess the health status and physical fitness of employees and to ensure that work assignments do not exceed the employee's physical capabilities.

### 8.2 FREQUENCY OF MEDICAL EXAMINATIONS

EG&G employees assigned to work at OU6 must undergo a baseline medical examination prior to initiating on site activities. After the initial exam, employees must have a follow-up medical exam at least once a year for as long as they work at the site, although the attending physician may suggest a shorter or longer interval, which must not be in excess of 2 years. Such a decision may be based on one or all of the following factors:

- Chemical or physical hazards that employees may be exposed to while working in or around OU6
- Concentration(s) of chemicals present in the work area
- Health effects experienced by employee(s) that may be associated with hazards at OU6
- Acute exposure(s) as a result of an emergency.



Employees must be trained to recognize symptoms such as dizziness, nausea, skin rash, etc., which may be indicative of exposure to hazards at the site. In the event that any such symptoms develop, or where a suspected overexposure occurs, the affected personnel must receive a medical examination as soon as possible after the incident or injury.

A worker who is reassigned to an area not associated with hazardous waste site work or who terminates employment must have a final medical exam if one has not been performed within the past 6 months. The content of the follow-up examination and employee termination examination will include, at least, those items included in the baseline examination. The physician can then make comparisons to previous data and possibly detect early signs of adverse health effects and facilitate protective measures. The attending physician may add to the testing and/or examination as needed.

### 8.3 CONTENT OF MEDICAL EXAMINATIONS

The content of the medical examination will be determined by the Occupational Health Director or, in certain situations, by a private attending physician and may include the following elements:

- A complete occupational and medical history emphasizing those signs and/or symptoms associated with exposure(s) to the hazardous materials identified in Section 3.0
- Smoking history
- Chest x-ray
- Pulmonary function test
- Electrocardiogram (EKG)
- Blood test and analyses for contaminants of concern
- Urine test and analyses for contaminants of concern
- Radiological bioassay for contaminants of concern (Radiological Engineering Representative will determine the need for baseline or periodic bioassays prior to the start of field work)

- Liver function test
- Examination of eyes, nose, and throat
- Examination of the nervous system
- Examination of the spine and other musculoskeletal systems
- Audiogram
- Pulse rate
- Body temperature
- Baseline bioassay.

The examining physician will provide a written opinion of the employee's ability and fitness to perform the required job task(s) and wear specific respiratory protection (Hazardous Waste Operations Form RF-47322). The physician will also take into consideration the fact that the employee may:

- Experience temperature extremes as a result of environmental conditions and/or wearing protective clothing
- Exert themselves physically as a result of performing the required job tasks
- Experience increased breathing effort while wearing respiratory protection.

#### 8.4 AVAILABILITY OF SERVICE

The Occupational Health Department is located in Building 122. The full staff is on duty from 7:30 a.m. to 4:00 p.m. Monday through Friday. The registered nursing staff is on duty from 6:30 a.m. on Monday through 10:00 p.m. on Friday. A physician and a nurse are always on call for any emergency during off hours. Weekend coverage (Friday from 10:00 p.m. through Monday at 6:30 a.m.) is provided by EMTs. They can be contacted at Extension 4336 and will meet employees in the Occupational Health Department or respond to the site of any emergency.

## **8.5 TRANSPORTATION FOR MEDICAL REASONS**

EG&G employees will be provided transportation for medical reasons (if it is medically safe, as determined by the Occupational Health Staff) to their home or to an appropriate medical facility for the following situations:

- An emergency: Occupational Health/EMT will determine the appropriate mode of transportation for illness/injury requiring air or ground ambulance transport
- A nonemergency: If there is no medical necessity for ambulance transport, supervisors will be asked to arrange transportation.

In a situation where an employee is injured and requires non-ambulance transport to an off-site medical facility, the supervisor or designee will accompany that person as a representative of EG&G and be available to interface with outside authorities (if necessary) and to provide further transportation for the employee as appropriate. Supervisors unable to arrange transportation on weekends or during night work should contact the Shift Superintendent (RFP Emergency Coordinator) for assistance.

## **8.6 OCCUPATIONAL HEALTH DEPARTMENT RESPONSIBILITIES**

The Occupational Health Department has responsibility for assisting management in ensuring the placement of employees in work situations that will not create undue hazard(s) to the individual, co-workers, plant facilities, the public, and the environment. The Medical Surveillance Program provides the database for these decisions. The Occupational Health Department is also responsible for applying preventive medical measures toward the maintenance of good physical and mental health of employees.

## **8.7 SUPERVISOR'S RESPONSIBILITY**

Supervisors are responsible for the following medical surveillance requirements:

- Confirming through the Occupational Health Department that employees are current with medical surveillance requirements and are fit and do not have restrictions that will interfere with their job performance

- Recognizing detectable signs and symptoms of overexposure to chemical or physical hazards (information pertaining to recognition of such signs or symptoms is acquired through resources such as the OSHA Health and Safety training, MSDS, and the hazard identification information provided in Section 3.0 of this document)
- Sending employees to the Occupational Health Department for a work restriction or re-evaluation if there has been a change in their physical or mental condition
- Consulting personnel files regarding employee restrictions prior to placing a job applicant in a vacancy.

## 8.8 EMPLOYEE'S RESPONSIBILITY

Medical surveillance requirements are not only the responsibility of the Occupational Health Department and supervisors but are also the responsibility of each employee. This includes the following responsibilities:

- Advising their supervisors of any physical or mental conditions that could affect work performance
- Recognizing the detectable signs or symptoms of overexposure to chemical or physical hazards
- Reporting all occupational injuries or illnesses immediately
- Reporting to the Occupational Health Department to have limitations verified or restrictions imposed (restrictions recommended by an off-site physician must be presented in writing to the Occupational Health Department)
- Reporting to the Occupational Health Department for re-evaluation as scheduled.

## 8.9 WORK PRACTICES

Work assignments may be temporarily or permanently modified on the basis of an employee's physical or mental state and environmental factors. The Occupational Health Department will perform an assessment, communicate the need for a medical restriction to appropriate persons, and follow up on restriction status.

## 8.10 MEDICAL RECORDS

Occupational Health Department keeps medical information in an individual's file, including laboratory reports, EKG reports, x-ray reports, health histories, physical examinations, letters, and reports from the employee's personal or referral physician.

### 8.10.1 Release of Medical Records and Medical Information

The medical record will remain in the possession of the Occupational Health Department and will not be taken from the premises except for the purpose of answering subpoenas. Copies of the medical record will be released to the employee, insurance companies, attorneys, hospitals, and/or physicians when a written authorization has been presented to the Occupational Health Department. A written authorization must:

- Specify that either EG&G or RFP is to release the information
- Be dated within the last 60 days
- Specify to whom the information is to be released
- Be completed in ink
- Be signed by the employee.

Medical information may not be released to anyone at RFP (supervisors, co-workers, etc.) without written authorization from the employee.

Employees of the Occupational Health Department and employees in Health and Safety Support Services, authorized by the Occupational Health Director, are the only employees who will have access to medical records.

Release of records associated with work-related or alleged work-related illness and injury does not require signed consent. A release may be requested to expedite communication with attending physicians.

### 8.11 SUBCONTRACTOR MEDICAL SURVEILLANCE PROGRAM

Subcontractors are responsible for providing and implementing a medical surveillance program for all of their employees assigned to work at OU6 that meet the requirements of 29 CFR 1910.120(f)(2).

Subcontractors will be given a copy of this OU6 SSHSP to use in developing their health and safety programs. The chemical, radiological, and physical hazards known to be present at the site are identified in the hazard assessment portion of this document, Section 3.0. This information and any additional information concerning hazards at the specific work location should be provided to the subcontractor's consulting physician so that a medical surveillance program can be developed that addresses the site-specific hazards.

The subcontractor physician must provide written authorization that each employee working at OU6 is fit to work. These records should be kept on file at the field support site and should be available for review by RFP personnel. If respiratory protection is required at the site, the physician must provide authorization that the employee is medically qualified to wear a respirator. Subcontractor personnel required to wear a respirator will be fit tested by the EG&G Industrial Hygiene Department or by the subcontractor if approval is granted by the EG&G Industrial Hygiene Department Respiratory Protection Program Administrator.

## 9.0 MONITORING

### 9.1 INTRODUCTION

The monitoring procedures for EG&G personnel working at OU6 include those for chemical contaminants and for radiological contaminants and have the following objectives:

- To characterize concentrations of dusts, mists, fumes, gases, and vapors present in the OU6 work areas
- To acquire sufficient quantitative data that will be used to verify the appropriate levels of PPE, site control measures and boundaries, and decontamination procedures
- To identify conditions that may be immediately dangerous to life or health.

### 9.2 MONITORING INSTRUMENTS

The following instruments will be used for site monitoring:

- An organic vapor meter, equipped with a photoionization or flame ionization detector, and a Dräger hand pump with detector tubes for specific chemicals of concern will be used to monitor for volatile organics
- A Bicon Frisk Tech, Ludlum 12-1A with air proportional probe, or equivalent will be used to monitor dry equipment surfaces and dry PPE for the presence of alpha-emitting radioisotopes
- A MIE PDM-3 Miniram real-time dust monitor or equivalent will be used to monitor for airborne particulates
- A constant-flow air sampling pump with appropriate sampling media will be used to collect samples for determination of concentrations of nonradiological contaminants in the workers' breathing zone
- Other monitoring instruments such as combustible gas meters will be used as necessary during field operations.

### 9.3 CHEMICAL AND RADIOLOGICAL MONITORING

The EG&G SHSC assigned to a field team will coordinate monitoring (as described below) and document results of monitoring. The subcontractor Health and Safety Officer will coordinate monitoring for subcontractor operations. All calibration activities will be performed in

accordance with generally accepted calibration practices and the results of calibration will be documented. Instruments will be performance-checked daily. Real-time monitoring will be conducted to provide an indication of the presence of potential hazards during intrusive activities. Other types of monitoring may be required during specific site activities.

#### 9.4 CHEMICAL-RELATED AIR MONITORING

Industrial Hygiene shall be responsible for conducting chemical contamination monitoring for EG&G employees. The frequency and type of air monitoring shall be determined by the Industrial Hygiene Department. Monitoring will be conducted when suspected compounds are expected to be present in significant quantity during work. The type of monitoring equipment to be used will vary based on the suspected compounds or contaminants.

##### 9.4.1 Real-Time Monitoring

Organic vapor monitoring may be conducted using real-time monitoring equipment and detector tubes. Real-time monitoring equipment will analyze an air sample within a short time frame and provide a readout of the air concentration of the contaminants.

##### 9.4.2 Personnel Monitoring

Personnel and Breathing Zone monitoring may be conducted for personnel performing field work. When personal monitoring is performed, personnel with the maximum potential for exposure to airborne compounds or contaminants will be monitored.

##### 9.4.3 Sampling Procedures

Air sampling procedures for compounds and contaminants will be in accordance with OSHA or NIOSH procedures, or the best demonstrated available technology where OSHA or NIOSH procedures are not available for a particulate contaminant.



A statistically significant number of samples, representative of the actual exposure to a compound or contaminant, will be obtained. In some instances sampling may be performed during the entire operation or shift.

Sampled workers will be notified of air sampling results in a timely manner.

## 9.5 RADIATION MONITORING

Radiological monitoring involves the detection and measurement of alpha, beta, gamma, or neutron radiation. Radiological monitoring is established in accordance with appropriate and relevant requirements and policies. The goal of the radiation monitoring program is to maintain personnel exposure ALARA. Personnel and equipment contamination surveys will be performed in accordance with the appropriate EMRG or ROI procedures. Air monitoring for potential radiological hazards is not anticipated to be necessary based on available information concerning OU6. If radiological hazards are identified through personnel and equipment surveys conducted during site work, air monitoring may become necessary. The Radiological Engineering Representative will be responsible for determining if an air sampling program is necessary and for developing and implementing an air sampling program if potential radiological hazards are identified during site work.

### 9.5.1 Personnel Monitoring

Monitoring of personnel for contamination will be performed in the following situations:

- Whenever leaving a Radiologically Controlled Area
- Whenever exiting a Contaminated Area
- During and after work where the potential exists for release of radioactive material
- Whenever passing through a Radiologically Controlled Area
- Following personnel decontamination
- When required by a SSHSP or the EMD Operating Procedures
- When required by a radiation work permit.

The methods of personnel monitoring will be conducted per the guidelines described in EMRG 2.1 or ROI 2.1.

#### 9.5.2 Surface Contamination Surveys

The purpose of the surface contamination surveys will be to control and document all property/material to be released from Radiologically Controlled Areas and specified uncontrolled areas (e.g., any IHSS). All procedures will be conducted per the guidelines described in HSP Manual Section 18.10, EMRG 3.1 and 3.2, or ROI 3.1 and 3.02.

#### 9.6 ACTION LEVELS

All decisions regarding application of action levels for nonradioactive substances will be based on air monitoring guidelines (refer to Table 9-1 for project action levels). The action level for measurements of radioisotopes with the Bicron Frisk Tech or equivalent will be based on surface measurements of dry soil, equipment, or PPE. The SHSC will notify the ERHSO immediately after any upgrade in PPE. Refer to Table 9-2 for Derived Air Concentrations for radiation exposures to workers and Table 9-3 for contamination control limits.

Table 9-1  
Action Levels

Condition/Instrument	Action Level	Responses
Organic Gases or Vapors	0-1 ppm	Level D protection
	1-5 ppm	Level C protection
	5-50 ppm	Level B protection
	>50 ppm	Evacuate area
Gas-Specific Detector Tubes or Specific Gas Analyzers	>1/2 to 10 times the TLV or PEL	Level C or B protection as appropriate; contact HSO or SHSC for respirator selection
	>10 times the TLV or PEL	Suspend operations and contact HSO or SHSC. Engineering controls may be necessary
Airborne Dust	0-2.5 mg/m <sup>3</sup>	Level D protection
	2.5-10 mg/m <sup>3</sup>	Level C protection
	10 mg/m <sup>3</sup>	Suspend operations and contact HSO or SHSC. Engineering controls may be necessary
Explosive Atmosphere	<10% LEL	Continue investigation
	10% - 25% LEL	Continue on-site monitoring with extreme care
	>25% LEL	Explosive hazard. Withdraw from area immediately
Oxygen Deficiency	<19.5% Oxygen	Evacuate the area. Monitor wearing SCBA or supplied air respirator. NOTE: Combustible gas readings may not be valid in atmospheres with <19.5% oxygen
	19.5 - 25% LEL	Continue investigation with caution. Oxygen levels >21% require extreme caution - levels other than normal may be due to the presence of other substances
	>25% Oxygen	Fire hazard potential. Stop work and consult with the HSO or SHSC
Airborne Radionuclides	>10% of DAC in worker breathing zone (Refer to Table 9-2)	Post area as AIRBORNE RADIOACTIVITY AREA; provide respiratory protection as specified by Radiological Engineering; and re-evaluate the activities, conditions, and precautionary requirements as necessary
Bicron Frisk Tech, Ludlum 12-1A, or equivalent	>250 cpm	Level C protection, notify HSO or SHSC
	>1,250 cpm	Level B protection, notify HSO or SHSC

PEL = Permissible Exposure Limit  
LEL = Lower Explosive Limit

Table 9-2  
Derived Air Concentrations

Derived Air Concentrations (DAC) for Controlling Radiation Exposure to Workers at DOE Facilities, from Attachment 1, page 4 of DOE Order 5480.11 dated 12-21-88.

Inhaled Air - Lung Retention Class

Radionuclide	D ( $\mu\text{Ci/ml}$ )	W ( $\mu\text{Ci/ml}$ )	Y ( $\mu\text{Ci/ml}$ )	Stochastic or Organ <sup>1/</sup> (D/W/Y)
Pu-239	--	2.E-12	6.E-12	-BS/BS
Am-241	--	2.E-12	--	-/BS/-
U-233	5.E-10	3.E-10	2.E-11	BS/St/St
U-234	5.E-10	3.E-10	2.E-11	BS/St/St
H-3 (water) <sup>2/</sup>	2.E-05	2.E-05	2.E-05	St/St/St

D = Daily

W = Weekly

Y = Yearly

$\mu\text{Ci/ml}$  = microcuries per milliliter

- 1/ A determination of whether the DACs are controlled by stochastic (St) or nonstochastic (organ) dose, or if they both give the same result (E) for each lung retention class is given in this column. The key to the organ notation for nonstochastic dose is: BS = Bone Surface, K = Kidney, L = Liver, Sin = Stomach wall, and T = Thyroid. A blank indicates that no calculations are performed for the lung retention class shown.
- 2/ The ICRP identifies tritiated water and carbon as having immediate uptake and distribution; therefore, no solubility classes are designated. For purposes of this table, the DAC values are shown as being constant, independent of solubility class. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 30: Limits for Intakes of Radionuclides by Workers. For elemental tritium, the DAC values are based solely on consideration of the dose-equivalent rate to the tissues of the lung from inhaled tritium gas contained within the lung, without absorption in the tissues.

Table 9-3  
Contamination Control Limits

TABLE I: ALPHA LIMITS			
Area	Removable		Total Fixed Plus Removable (dpm/100 cm <sup>2</sup> )
	Smears (dpm/100 cm <sup>2</sup> )	Swipes (dpm)	
Uncontrolled	20	N/A	300 <sup>2/</sup>
Controlled	20	N/A	300 <sup>2/</sup>
Radiological	200	500 <sup>1/</sup>	3,000 <sup>2/</sup>

TABLE II: BETA/GAMMA LIMITS		
Area	Removable Smear (dpm/100 cm <sup>2</sup> )	Total Fixed Plus Removable (dpm/100 cm <sup>2</sup> )
Uncontrolled	200	5,000 <sup>3/</sup>
Controlled	200	5,000 <sup>3/</sup>
Radiological	1,000	5,000 <sup>3/</sup>

- 1/ Minimum detectable activity using the Ludlum Model 12-1A with air proportional detector. Total efficiency (instrument and detector) is 50 percent or as indicated on the calibration sticker. 250 cpm equals 500 dpm. No activity per area is specified since swipes are not used to quantify activity levels.
- 2/ 300 dpm/100 cm<sup>2</sup> is the DOE Limit for Uncontrolled and Controlled Areas. 3,000 dpm/100 cm<sup>2</sup> is the DOE Limit for Radiological Areas. The minimum detectable activity using the Ludlum Model 12-1A with air proportional detector of approximately 50 cm<sup>2</sup> is 1,000 dpm/100 cm<sup>2</sup> which corresponds to a 250 cpm instrument meter reading of 500 dpm.
- 3/ 5,000 dpm/100 cm<sup>2</sup> is the DOE Limit for Uncontrolled and Controlled Areas and is the Rocky Flats Limit for Radiological Areas. The minimum detectable activity (MDA) using the Ludlum Model 31 rate meter with the 44-9 pancake GM detector is 5,000 dpm/100 cm<sup>2</sup>. This corresponds to a meter reading of 200 cpm. The maximum allowed background for this MDA is 100 cpm with the instrument range switch on the X1 setting.

## 10.0 TRAINING

EG&G personnel assigned to OU6 must complete the training required by OSHA as well as site-specific health and safety training courses required by EG&G. OU6 is an environmental investigation classified as a hazardous waste operation by OSHA standard 29 CFR 1910.120; therefore, the training requirements, including the initial training, annual refresher training, and supervisor training, apply to EG&G and subcontractor personnel working at the site. Additional required training courses include hazard communication, radiation worker, and respirator training.

### 10.1 TRAINING REQUIREMENTS AND COURSE CONTENT

#### 10.1.1 Hazardous Waste Site Health and Safety

Any EG&G employee assigned to work at OU6 must complete the hazardous waste health and safety course required by OSHA in 29 CFR 1910.120(e). The length of the required course may be 40 hours or 24 hours, based on the worker's assigned tasks. The 40-hour course and 3 days of supervised field experience is mandatory for workers who may be required to use respiratory protection equipment and/or who are engaged in activities in which they may be exposed to hazardous substances and health hazards at or above the Permissible Exposure Limits (PEL).

EG&G employees assigned to the OU6 project who are required to complete 40 hours of training include the ER Project Manager, the ERHSO, the Industrial Hygiene Representative, the Health and Safety Liaison Officer, and the SHSC. Additional personnel "who are onsite occasionally for a specific limited task," such as inspectors, managers, or other site visitors, are required to complete a minimum of 24 hours of training and 1 day of supervised field experience. An outline of the 40-hour course is presented in Table 10-1. The 24-hour course contains the same lecture material as the 40-hour course but does not include the field exercises.

All hazardous waste workers must complete an annual 8-hour refresher course. The course content consists of a summary of the 40-hour course.

Table 10-1  
EG&G Hazardous Waste Workers  
Health and Safety Course Content

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Module 1:	Description of Lessons and Instructional Objectives
Module 2:	Introduction
Module 3:	Review of Regulations
Module 4:	Definitions
Module 5:	Sources of Hazard Information
Module 6:	Hazards in the Work Environment
	Section 1: Chemical Hazards
	Section 2: Compressed Gases
	Section 3: Ionizing Radiation
	Section 4: Heat Stress
	Section 5: Cold Stress
	Section 6: Confined Space
	Section 7: Safety Hazards
	Section 8: Noise
Module 7:	Generic Site Safety Plan
Module 8:	Incident Command
Module 9:	Medical Surveillance
Module 10:	Toxicology
Module 11:	Site Control, Characterization, and Monitoring
Module 12:	Personal Protective Equipment
Module 13:	pH Acid/Bases
Module 14:	Decontamination
Module 15:	Spill Response
Module 16:	Levels C and B Exercises <sup>1/</sup>

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1/ Levels C and B exercises are not included in the 24-hour course.

Supervisors of hazardous waste sites or of tasks conducted on hazardous waste sites must complete, at a minimum, the same baseline training (24-hour or 40-hour) as the workers they supervise and an additional 8-hour supervisor health and safety training course. Table 10-2 lists examples of the topics covered in the supervisor training course.

#### 10.1.2 Radiation Worker Training

EG&G personnel and subcontractors working on ER sites must complete the "Protecting the Radiation Worker" course offered by the EG&G Performance Based Training Department or an approved equivalent. The course is a 3-day class devoted to educating EG&G personnel in awareness of the hazards involved in working in areas potentially contaminated with radionuclides. At ER sites, the 1-day class entitled "Radiation Safety for Environmental Restoration" is an approved equivalent to the 3-day "Protecting the Radiation Worker" course for subcontractor employees only. EG&G employees must complete the 3-day "Protecting the Radiation Worker" course.

#### 10.1.3 Site-Specific Briefing

EG&G employees assigned to work on OU6 must receive a briefing that introduces site safety, emergency procedures, and the information contained in the SSHSP. The briefing should provide enough detail that employees can implement the SSHSP and safely perform their assigned tasks. This briefing may be incorporated into the 24- or 40-hour hazardous waste health and safety training program and will be coordinated by the ER PM in conjunction with the pre-construction conferences. One day of field experience or 3 days of field experience must correspond with the 24- or 40-hour health and training program (respectively) to complete full training.

Visitors who do not have the required OSHA training and medical certifications will not be allowed to enter the site EZ or CRZ. Prior to gaining access to the site, visitors to OU6 will have an orientation that summarizes the SSHSP. This orientation does not qualify the visitor to access-controlled areas of the site. The purpose of the briefing is to provide sufficient information on the hazards and control measures at the site to prevent the visitor from



Table 10-2  
Example Supervisor Health and Safety Training Course Outline

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Manager and Supervisor Responsibilities

1. Worker On-The-Job Training
  2. Work Site Characterization
  3. Pre-emergency Planning
  4. Selection of Proper Personal Protective Equipment
  5. Superfund Amendments and Reauthorization Act (SARA) Title III
  6. Legal Aspects of Supervision
  7. Potential Problem Analysis
  8. Remedial Action - Lessons Learned
-

unknowingly violating any site control measures. Visitors will be escorted by a trained site employee during the entire visit.

Visitors will provide signature verification that they have read, understand, and will comply with the requirements of the SSHSP. Signatures are recorded in a logbook, which is maintained at the site by the PM.

#### 10.1.4 Safety Meetings

Discussion at weekly safety meetings may include the following topics:

- Health and safety considerations and the required PPE for current operations
- Any revisions to the OU6 SSHSP
- Any new MSDS filed on the ER project work site
- Documented or observed unsafe acts committed at the worksite, a clarification of the safety requirements violated, and methods to prevent future violations
- Other topics specified in the HSPM, Section 2.01.

Workers are required to attend the weekly safety meetings and sign a roster (attendance sheet) that will be submitted to the ERHSO. Meeting minutes will be documented and attached to the roster. The PM will review the meeting minutes with absentees and have them sign the attendance sheet. The PM will submit the minutes and the attendance sheet to the ERHSO. This documentation will be filed at the work site and will be archived when the project is completed.

#### 10.1.5 Rehearsal of Emergency Response Plan

The OSHA Standard 29 CFR 1910.120 requires rehearsal of the Emergency Response Plans. Such a rehearsal will be conducted within 30 days of start-up of operations at a hazardous waste site. Emergency Preparedness will coordinate and document the rehearsals, which will be used to evaluate the effectiveness of the plan. The SHSC will ensure that subcontractors perform rehearsals with site personnel and will ensure that site personnel are prepared to respond to an

emergency. Emergency response to a RFP emergency will be handled according to the RFP Emergency Response Plan and will apply to all persons at RFP.

## 10.2 IMPLEMENTATION OF TRAINING

Training for EG&G personnel is provided by the EG&G Performance Based Training Department. Most training is conducted in-house, with the assistance of various health, safety, and environmental departments. Some training is provided by academic organizations or other subcontractors. The Manager of Plant General Employee Training serves as the point of contact for EG&G training course availability.

Training of subcontractors for work at RFP is the responsibility of the subcontractor. Training must meet the performance requirements of EG&G and OSHA. Subcontractor personnel may be required to complete EG&G CBT modules, including Respirator Indoctrination (required if respirators will be worn on site) and Radiation Safety.

## 10.3 PERFORMANCE EVALUATIONS

The training requirements described in this section are designed to teach skills applicable to fieldwork at OU6. Workers and supervisors are responsible for learning and applying these basic skills and concepts. EG&G will evaluate its workers' abilities by administering tests during training courses and field performance evaluations. The training department has established testing procedures and minimum score requirements for course examinations. The SHSC will conduct field audits to evaluate worker health and safety skills. The Health and Safety Liaison Officer will ensure that unannounced audits are performed at least quarterly. Below-average performance on examinations or field evaluations may disqualify a worker from working at the site until the worker's performance has improved.

#### 10.4 VERIFICATION OF TRAINING

EG&G Plant Training will maintain documentation of the completed required training for EG&G personnel working at the site; the SHSC will verify this documentation for affected personnel. The subcontractor Health and Safety Officer will maintain documentation of subcontractor employee training (including supervised field experience) on file at the work site. Site employees will also provide signature verification that they have read, understood, and will comply with the OU6 SSHSP and the EG&G Health and Safety Program Plan. All personnel conducting or supervising investigations in OU6 are required to provide documentation of training.

## 11.0 EMERGENCY RESPONSE

### 11.1 PURPOSE

The purpose of the Emergency Response Plan for OU6 is to have a detailed, predetermined strategy for handling potential emergency situations. Pre-emergency planning is required to expedite appropriate action and minimize the severity and consequences of emergencies. The plan is designed to protect RFP personnel from possible hazards created by emergency situations. In addition to safeguarding RFP personnel, the plan is designed to protect plant personnel and the public from contaminants that could move off site, protect property adjacent to the OU6 area, and prevent equipment loss from hazards associated with OU6 activities. This section details procedures to be followed during an emergency at the OU6 site.

It is critical that key personnel are informed of emergency situations immediately so that response efforts can be carried out effectively. Success will depend on the efforts of appropriate personnel and the input they can provide as a result of training and experience. Teamwork is crucial for abating hazards and minimizing damage.

Emergency assistance should always be requested when it is unclear whether there is a need for support personnel. The contacted party can decide, after hearing a description of the problem or after observing the situation, whether or not support personnel are needed.

### 11.2 NOTIFICATION

#### **LIFE-THREATENING EMERGENCIES--CALL EXTENSION 2911**

#### **NON LIFE-THREATENING EMERGENCIES--CALL EXTENSION 2914**

Notification requirements for emergency situations at OU6 depend on the nature of the perceived emergency (e.g., spill, injury, illness, fire) and the extent to which the damage and/or injuries have progressed. Upon discovery of a release of materials or other non life-threatening emergency situation, the on-site supervisor will be immediately notified at extension 5355 and the Radiation Protection Area Manager at extension 7571. The supervisor will evaluate the situation and notify appropriate personnel. If the supervisor is not available and the situation is

not life-threatening, the Shift Superintendent will be notified at extension 2914. If there is no answer at 2914, refer to 2911.

If the supervisor is not available or the situation is life-threatening, RFP emergency response personnel will be notified as detailed below.

**Call extension 2911 to obtain emergency assistance for life-threatening emergencies and to simultaneously access the following situations:**

- **Emergency Coordinator (Shift Superintendent)**
- **Plant Protection Central Alarm Station**
- **Fire Department Dispatch Center**
- **Medical Department**

**As much detail about the emergency as possible will be provided. A decision to dispatch any or all of the following equipment will be made based on the provided information:**

- **Fire Engine**
- **Ambulance**
- **HAZMAT Response Vehicle**

**Provide the following information, upon request, to the Emergency Dispatcher:**

- **Informant's name**
- **Exact location of the emergency**
- **Nature of the emergency**
- **Condition of the patient if applicable (breathing, consciousness, bleeding, etc.)**
- **Special hazards in the area**
- **Any other information requested**

If no details are given, emergency response personnel will respond automatically.

The Emergency Coordinator (EC) will immediately respond to emergencies. The RFP Protection Central Alarm Station will activate the Building Emergency Support Team by the Life Support/Plant Warning Public Address System. The EC will activate the Emergency Operation Center and notify departments that have an advisory role in the situation, if applicable. The EC will determine whether additional help from offsite agencies (e.g., police, hospitals) is required.

The EC will also notify the following groups when appropriate:

- Radiological Engineering
- Industrial Hygiene
- Industrial Safety
- Waste Operations
- Waste Programs
- Traffic
- Occurrence Notification Officer
- Health and Safety Area Coordinator

Radiological Engineering and Industrial Hygiene will assess any hazards associated with the release of spilled material. Waste Operations will determine the appropriate clean-up techniques and personnel. Waste Programs will evaluate the incident for RCRA/Comprehensive Environmental Response, Compensation, and Liability Act reporting requirements. In the event of a spill, notification must also be made to Response and Reporting at 7264.

### 11.3 SPECIFIC SITE HAZARDS

The response to and abatement of most emergency situations at OU6 will require the expertise of RFP emergency response personnel. Situations that will require the assistance of RFP emergency responders include, but are not limited to the following:

- Accidents resulting in physical injury
- Accidents resulting in chemical or radiological exposure
- Incidents where the substance cannot be absorbed, neutralized, or otherwise controlled at the time of release
- Situations where there is a potential for safety or health hazards (i.e., fire, explosion, or chemical/radiological exposure, etc.)

#### **11.4 FIRES AND EXPLOSIONS**

**IN THE EVENT OF A FIRE OR EXPLOSION, IMMEDIATELY CALL EXTENSION 2911.** In the event of a fire or explosion, personnel will immediately evacuate the area. Evacuation will be a minimum of 300 ft upwind/crosswind of the emergency. The emergency will be handled by the Fire Department and their designees.

Portable fire extinguishers are available to trained personnel for small, controllable incipient fires. Fires, regardless of size, are to be reported to the Fire Department.

#### **11.5 SPILLS OF HAZARDOUS AND RADIOACTIVE MIXED WASTE AND HAZARDOUS MATERIAL**

**REPORT TO THE EMERGENCY COORDINATOR AT EXTENSION 2911** all spills where the substance cannot be absorbed, neutralized, or otherwise controlled at the time of release, or where there is a potential for safety or health hazards (fire, explosion, chemical, or radiological exposure). The Emergency Coordinator will dispatch the HAZMAT Response Vehicle and any other necessary support personnel.

Spills that do not require a HAZMAT response shall be cleaned up by site personnel according to an approved SOP. Spills onto porous ground will require removal of contaminated dirt as well as the spilled material and is expected to be classified as hazardous and radioactive mixed waste. All spills will be handled according to RCRA guidelines as defined in Hazardous Waste Manual (formerly RCRA SOP).

#### **11.6 POST-EMERGENCY RESPONSE EQUIPMENT MAINTENANCE**

Equipment used in emergency situations will be decontaminated by wiping with a soap solution. Rags used for decontamination will be disposed as low-level radioactive waste, if necessary. Contaminated heavy equipment used in emergencies will be thoroughly decontaminated prior to being released from the site. Subcontractors will follow approved decontamination protocols described in their site-specific health and safety plans for heavy equipment decontamination. A



decontamination pad for equipment is currently located east of the subcontractor trailer complex. Equipment will not be released until monitoring indicates that contaminant levels are less than 20 dpm/100 cm<sup>2</sup> (above background) and that chemical contamination is not present in accordance with DOE Order 5480.11.

#### 11.7 EMERGENCY EQUIPMENT LOCATION

Emergency equipment located at OU6 will include first-aid kits and fire extinguishers. An emergency eye wash and shower will be provided for tasks where eye hazards may exist. These items may be located in the subcontractor trailers on the site. Fire extinguishers are also located in subcontractor vehicles and are temporarily located at sites where there is a potential for fires (e.g., during welding operations).

#### 11.8 EVACUATION PLAN

Personnel and visitors to OU6 will evacuate the area if any of the following occur:

- If a site emergency (such as a fire or chemical spill) develops
- If instructed by site supervision
- If instructed by the Shift Superintendent over the site radio or telephone system.

After an evacuation, each supervisor is required to verify that the employees that he/she supervises are accounted for.

#### 11.9 COMMUNICATION

Telephones are available in most subcontractor trailers. In addition, radios are used by field personnel to maintain contact with the PM or other designated persons in the trailers who have access to telephones. Radio frequencies are monitored by the RFP security system to ensure that response time is minimal in the event of an accident or emergency on the site. In the event of a plant emergency, Central Dispatch will notify the trailers and field personnel by telephone and radio. If Central Dispatch fails in its attempt to contact anyone onsite, a security car will be sent to the site to alert personnel of the emergency.

## 12.0 MATERIAL HANDLING

### 12.1 INTRODUCTION

Guidelines for handling, transporting, labeling, and disposal of hazardous substances and contaminated soil, liquid, and other residue are outlined in 29 CFR 1910.120(j) "Handling Drums and Containers." It is not anticipated that EG&G employees will be involved in operations that require handling containers or drums of hazardous materials; however, subcontractors will be required to have a materials handling program in place for operations at OU6. Refer to EMD Operating Procedure FO.10, Receiving, Labeling, and Handling of Waste Containers. Additional material handling and storage requirements at RFP are outlined in the HSPM, Section 9.0.

### 12.2 SUBCONTRACTOR MATERIALS HANDLING PROGRAM

Subcontractor health and safety plans shall include procedures for material handling, as outlined in 29 CFR 1910.120 (j), if employees will be handling drums, containers, or tanks containing hazardous substances or contaminated materials. The plans will contain requirements for drum handling and labeling; spill response procedures; guidelines for excavation of drum burial locations; drum opening procedures; specific requirements for handling of radioactive, shock-sensitive, or laboratory waste; and procedures for shipping and transporting containerized waste as applicable. Operating procedures for waste handling have been developed by the ER Department and will be available to subcontractors for guidance in determining how to containerize and dispose of generated waste. Hazardous waste storage will be in accordance with EG&G Waste Operations guidance.

### 13.0 NEW TECHNOLOGIES

#### 13.1 INTRODUCTION

OSHA requires that employers develop and implement procedures to introduce "effective new technologies and equipment developed for the protection of employees" (29 CFR 1910.120[o]) working at hazardous waste clean-up operations. New products and techniques must be evaluated by employers before they are implemented on a large scale.

#### 13.2 PROGRAM IMPLEMENTATION

EG&G has an extensive health, safety, and environmental protection program made up of multiple departments with specific areas of expertise. A representative from each of the health and safety-related disciplines is assigned responsibility for OU6. Each representative is responsible for promoting a safe work environment by actively seeking ways to improve safety at the site. Each discipline (Safety and Hygiene, ER, Radiological Engineering, etc.) participates in continuing education, national conferences, and seminars at which products and technology are demonstrated and studies of their effectiveness are reviewed. Departmental representatives attending these conferences and seminars are directed to review new products appropriate for use at hazardous waste sites. In addition, EG&G is active in research and development of new products and technologies through specific government contracts.

#### 13.3 METHODS OF EVALUATION

OSHA requires that EG&G's efforts, in the area of new product and technology evaluation, be documented and made available to the OSHA inspector upon request. The departments responsible for evaluation of specific products and technologies are listed in Table 13-1.

Table 13-1  
Evaluation Procedures by Department

Product or Technologies	Department
Chemical protective clothing	Industrial Hygiene
Respiratory protection	Industrial Hygiene, Radiological Engineering
Equipment used to protect against falls, impacts, explosions, etc.	Industrial Safety
Radiation safety equipment	Radiological Engineering
Chemical monitoring equipment	Industrial Hygiene
Radiation monitoring equipment	Radiological Engineering
Particulate and vapor emission control devices	Industrial Hygiene, Radiological Engineering
Chemical or radiological product containment, neutralization, or stabilization products	Radiological Engineering, Industrial Hygiene
Material handling equipment	Industrial Safety

#### 14.0 REFERENCES

EG&G. 1990. Health and Safety Plan Workbook. EG&G, Rocky Flats Plant, Inc., Golden, CO.

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EG&G. 1990. Background Geochemical Characterization Report for 1989. Rocky Flats Plant, Inc., Golden, CO.

EG&G. 1991. Phase I RF/RI Work Plan OU6, Final. Rocky Flats Plant, Inc., Golden, CO.

Rockwell International. 1986. Trends in Rocky Flats Surface Water Monitoring.

APPENDIX A

IHSS LOCATION MAPS FROM  
OPERABLE UNIT 6 PHASE I RFI/RI WORK PLAN

APPENDIX B

SUBCONTRACTOR FIELD ACTIVITIES FROM  
OPERABLE UNIT 6 PHASE I RFI/RI WORK PLAN

TABLE 7-1

PHASE I INVESTIGATION  
IHSS 141 - SLUDGE DISPERSAL AREA

Activity	Purpose	Location	Number of Samples or Locations
Radiation survey	Locate areas of anomalous radiation readings	Entire site - 25 ft grid	NA
Surface soil sampling	Characterize surface contamination and areas of anomalous radiation readings	Entire site - 25 ft grid and areas of anomalous radiation readings except under buildings and roads	60
Install well	Monitor alluvial groundwater downgradient of the unit	See Figure 7-1	1

NA - Not Applicable

B-1



TABLE 7-2

**PHASE I INVESTIGATION  
IHSS 142.1-9 and 142.12 - A and B SERIES PONDS**

Activity	Purpose	Location	Number of Samples or Locations
Collect surface water samples	Characterize surface water contamination	5 locations in each pond and from each vertically stratified zone at the deepest point in the pond	72
Collect sediment samples in ponds	Characterize sediments in ponds and contamination	5 locations in each pond. Samples will also be taken from each 5 centimeter interval of sediment from the deepest part of each pond.	50
Collect sediment samples in other locations on Walnut Creek	Characterize Walnut Creek sediments and contamination	See Figure 7-4 and text.	13
Install wells	Monitor alluvial groundwater downgradient of the Ponds A-4 and B-5	Below ponds A-4 and B-5 dams (2 each)	4

B-2

TABLE 7-4

**PHASE I INVESTIGATION  
IHSS 143 - OLD OUTFALL AREA**

Activity	Purpose	Location	Number of Samples or Locations
Radiation survey	Locate areas of anomalous radiation readings	Entire site - 10 ft grid	NA
Surface soil sampling	Characterize surface contamination and areas of anomalous radiation readings	Entire site - 20 ft grid and areas of anomalous radiation readings, and along drainage	11
Subsurface soil sampling	Characterize top two feet of soil and areas of anomalous radiation readings	Same as surface locations. Sampling will extend to 2 feet below the fill layer	11
Fill sampling	Determine if contamination is present to fill	Composite sample of fill from every fourth soil boring	3

NA - Not Applicable

B-3

TABLE 7-5

**PHASE I INVESTIGATION  
IHSS 156.2 - SOIL DUMP AREA**

Activity	Purpose	Location	Number of Samples or Locations
Review aerial photographs and radiation surveys	Identify extent	Entire site	NA
Radiation Survey	Locate areas of anomalous radiation readings	Entire site	NA
Surface soil samples	Characterize surface materials and contamination and areas of anomalous radiation readings	Entire site - 150-ft grid	14
Soil borings	Characterize subsurface conditions and materials	Entire site - 150-ft grid. Borings will be drilled 3 ft into the undisturbed soils beneath the soil piles	14
Install wells	Monitor groundwater in bedrock sand zone, if encountered	In western part of unit	1

NA - Not Applicable

TABLE 7-6

**PHASE I INVESTIGATION  
IHSS 165 - TRIANGLE AREA**

Activity	Purpose	Location	Number of Samples or Locations
Review aerial photographs	Identify extent	Entire site	NA
Radiation survey	Locate areas of anomalous radiation readings	Entire site - excluding PSZ fence - 25 ft grid	NA
Soil gas survey	Locate plumes of volatiles	Entire site - excluding PSZ fence - 100 ft grid	56
Surface soil samples	Verify presence or non-presence of volatiles identified during soil gas survey and characterize areas of anomalous radiation readings	VOC and areas of anomalous radiation readings	6-15
Soil cores	Verify presence or non-presence of volatiles identified during soil gas survey	Random basis, 1 sample, every 15 soil gas samples, at the depth of the soil gas probe.	4
Soil borings (if plumes are identified)	Transect plumes identified by soil gas or radiation survey, if identified	Three borings transecting three highest soil gas locations. Borings will be drilled 3 ft. into weathered bedrock.	Maximum of 9
Install wells	Monitor groundwater under the unit	One well east of PSZ and one in north part of unit within PSZ	2

NA - Not Applicable

TABLE 7-7

**PHASE I INVESTIGATION  
IHSS 166 - TRENCHES A, B, AND C**

Activity	Purpose	Location	Number of Samples or Locations
Review aerial photographs	Identify location and extent of the trenches	Entire site	NA
Geophysical survey	Locate and delineate extent of the trenches	Each trench area	NA
Soil classification survey	For Environmental Evaluation	Entire site	NA
Soil borings	Characterize materials and contamination in trenches and size of trench	Transecting the trenches longitudinally every 25 ft. Borings will be drilled to 5 ft below the bottom of the trench.	26
Install well	Monitor alluvial groundwater downgradient of Trench B (166.2)	In most eastward boring at IHSS 166.2, immediately east of the trench	1

NA - Not Applicable

B-6

**TABLE 7-8**

**PHASE I INVESTIGATION  
IHSS 167 - NORTH, POND, AND SOUTH AREA SPRAY FIELDS**

Activity	Purpose	Location	Number of Samples or Locations
Review aerial photographs	Identify location and extent of the units	Entire site	NA
Soil classification survey	For Environmental Evaluation	Entire site	NA
Surface soil sampling	Characterize surface contamination	Entire site - 100 ft grid	57
Soil borings	Characterize subsurface conditions and contamination to 4 ft.	Entire site - 100 ft grid	57
Collect sediment samples	Characterize sediments and contamination downstream of the unit	Within the drainage downstream of the unit	2
Install wells	Monitor alluvial ground water downgradient of the spray fields	Within the drainages downgradient of units 167.1 and 167.3	2

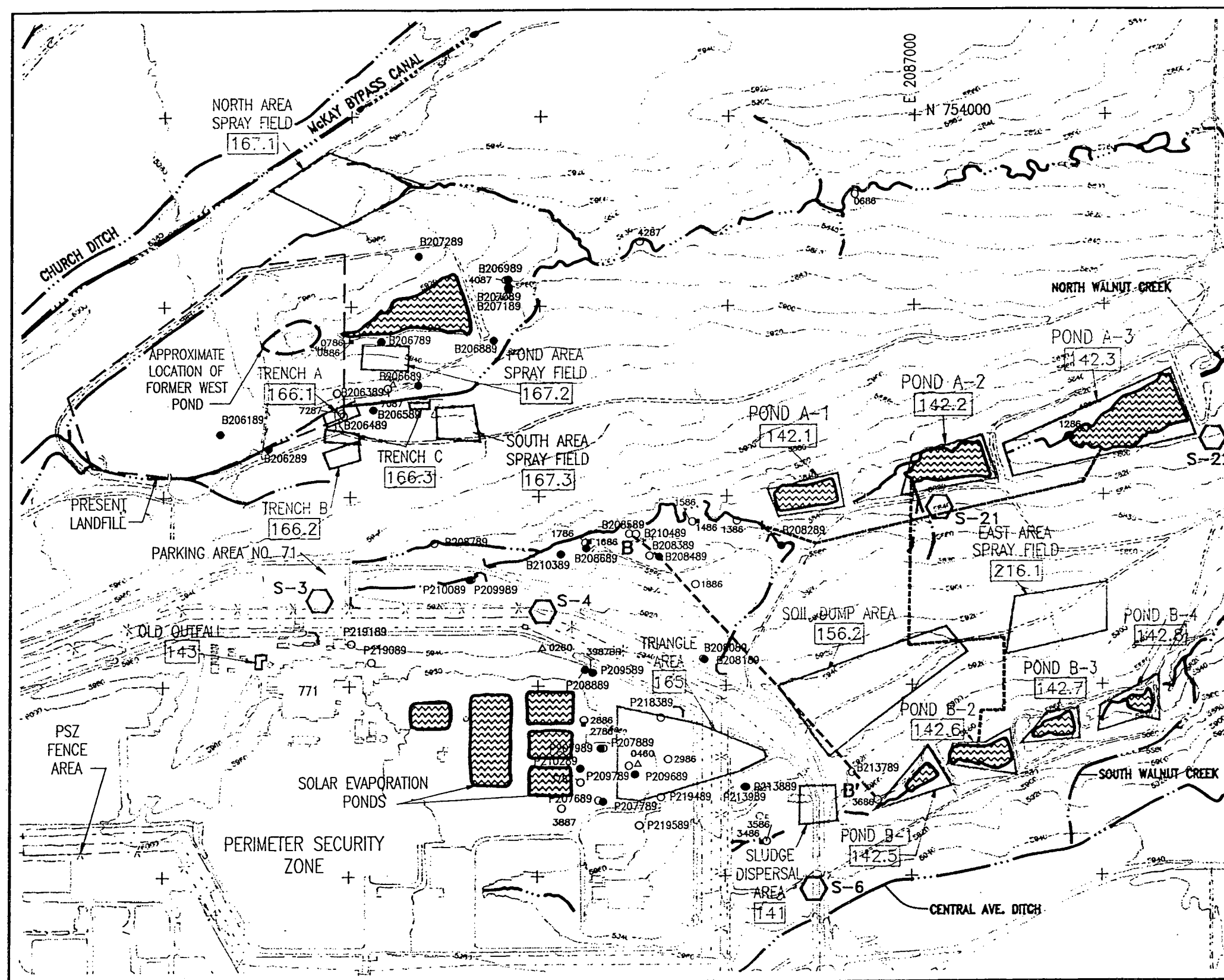
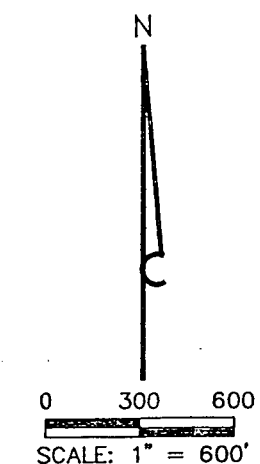
NA - Not Applicable

**TABLE 7-9**

**PHASE I INVESTIGATION  
IHSS 216.1 - EAST AREA SPRAY FIELD**

Activity	Purpose	Location	Number of Samples or Locations
Surface soil sampling	Characterize surface contamination	Entire site - 200 ft. grid	6
Soil borings	Characterize subsurface conditions and contamination to 4 ft.	Entire site - 200 ft. grid	6

B-8

MATCHLINE  
(SEE FIGURE 2-1 [2 OF 2])

## EXPLANATION

- INDIVIDUAL HAZARDOUS SUBSTANCE SITE (IHSS) IN OPERABLE UNIT 6
- IHSS REFERENCE NUMBER
- PERIMETER SECURITY ZONE
- DIRT ROAD
- EXISTING RADIOACTIVE AMBIENT AIR MONITORING PROGRAM LOCATION
- EXISTING ALLUVIAL GROUNDWATER MONITORING WELL
- EXISTING BEDROCK GROUNDWATER MONITORING WELL
- EXISTING PRE-1986 GROUNDWATER MONITORING WELL
- EXISTING PRE-1988 BEDROCK GROUNDWATER MONITORING WELL
- INTERMITTENT STREAM
- CROSS-SECTION B-B', SEE FIGURE 2-6
- A-1 BYPASS (UNDERGROUND PIPELINE)
- UNDERGROUND PIPELINE FROM POND B-2 TO POND A-2

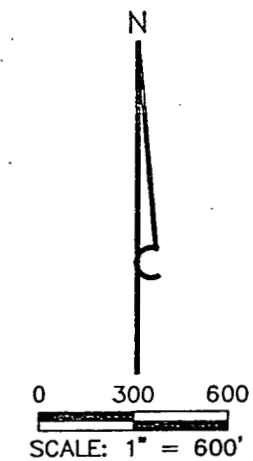
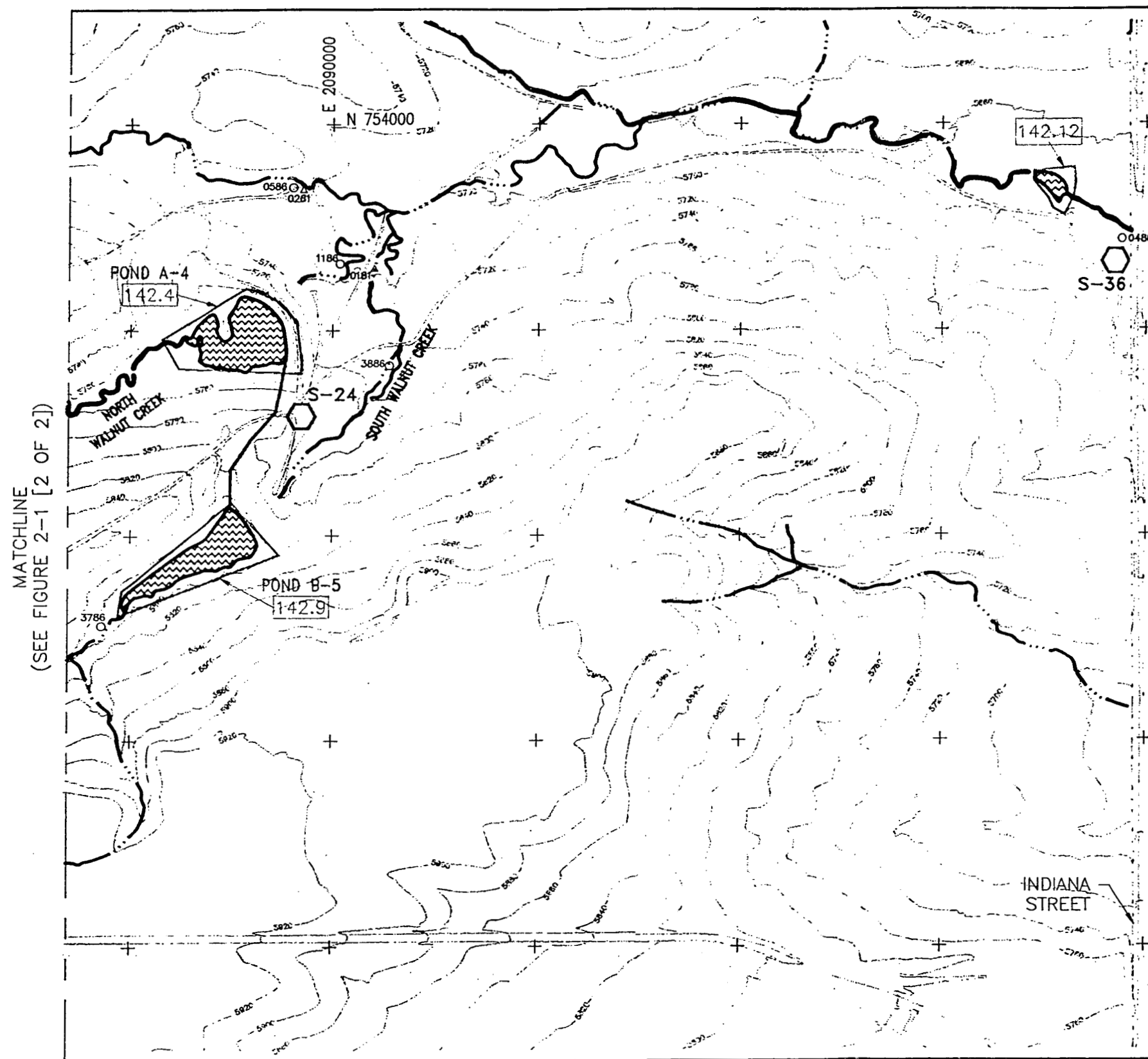
U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 6  
PHASE I RFI/RI WORK PLAN

LOCATION MAP OF INDIVIDUAL  
HAZARDOUS SUBSTANCE SITES,  
MONITORING WELLS, AIR MONITORING  
STATIONS, & DIVERSION STRUCTURES  
ALONG NORTH & SOUTH WALNUT CREEKS

FIGURE 2-1 (1 OF 2) REV. AUGUST 1991  
APRIL 1991





### EXPLANATION

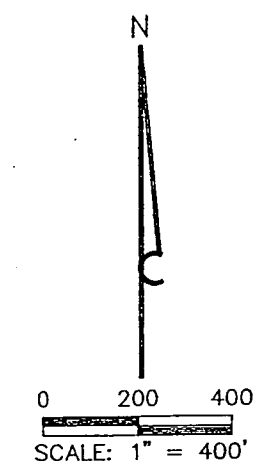
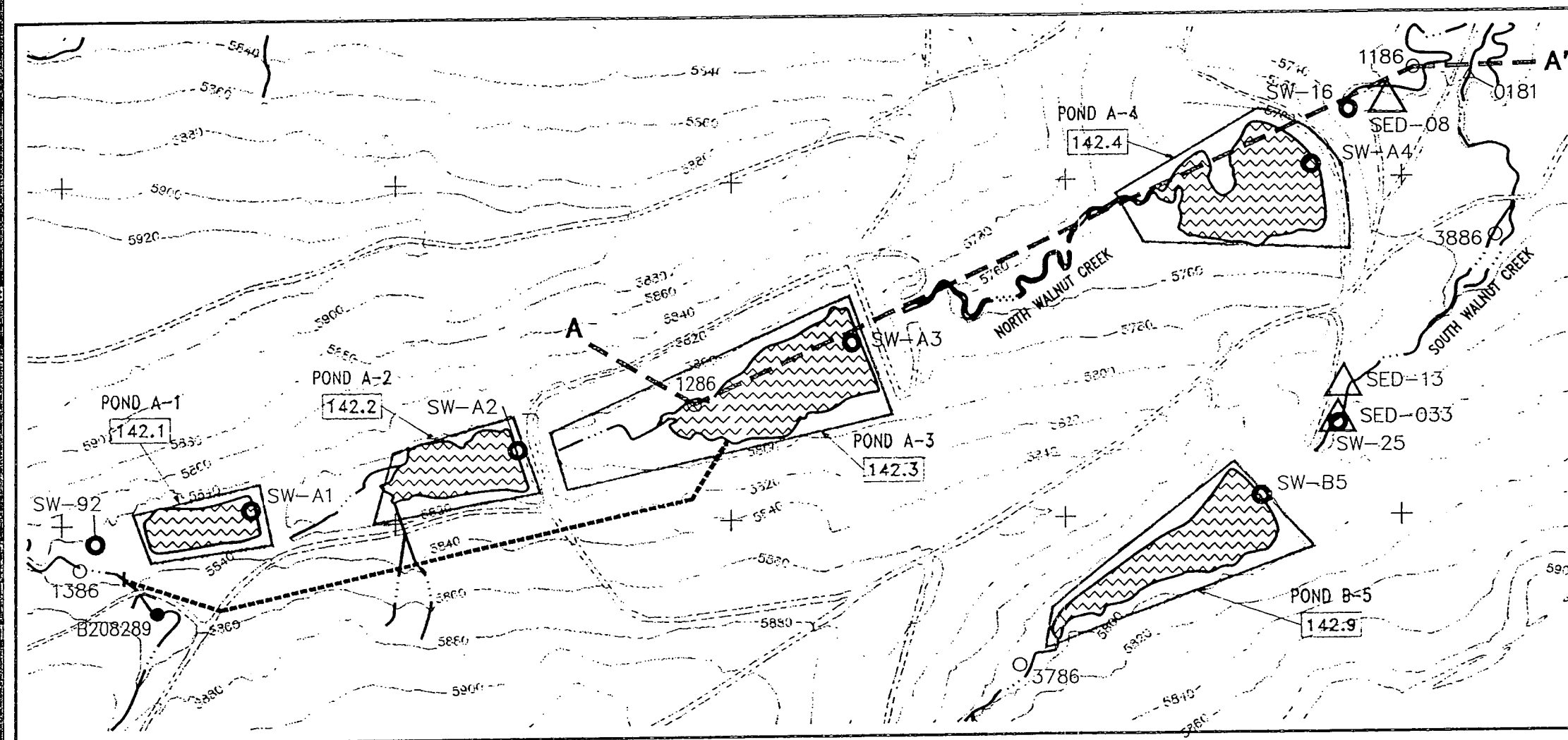
- INDIVIDUAL HAZARDOUS SUBSTANCE SITE (IHSS) IN OPERABLE UNIT 6
- IHSS REFERENCE NUMBER
- PERIMETER SECURITY ZONE
- DIRT ROAD
- S-22  
EXISTING RADIOACTIVE AMBIENT AIR MONITORING PROGRAM LOCATION
- 5786  
EXISTING ALLUVIAL GROUNDWATER MONITORING WELL
- B208189  
EXISTING BEDROCK GROUNDWATER MONITORING WELL
- 0181  
EXISTING PRE-1986 GROUNDWATER MONITORING WELL
- 1486  
EXISTING PRE-1988 BEDROCK GROUNDWATER MONITORING WELL
- INTERMITTENT STREAM
- TRANSFER LINE FROM POND B-5 TO POND A-4

U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 6  
PHASE I RFI/RI WORK PLAN

LOCATION MAP OF INDIVIDUAL  
HAZARDOUS SUBSTANCE SITES,  
MONITORING WELLS, AIR MONITORING  
STATIONS, & DIVERSION STRUCTURES  
ALONG NORTH AND SOUTH WALNUT CREEKS

REV. AUGUST 1991  
FIGURE 2-1 (2 OF 2) APRIL 1991



# EXPLANATION

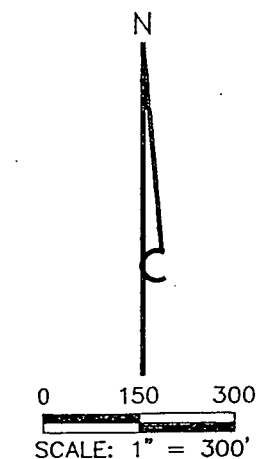
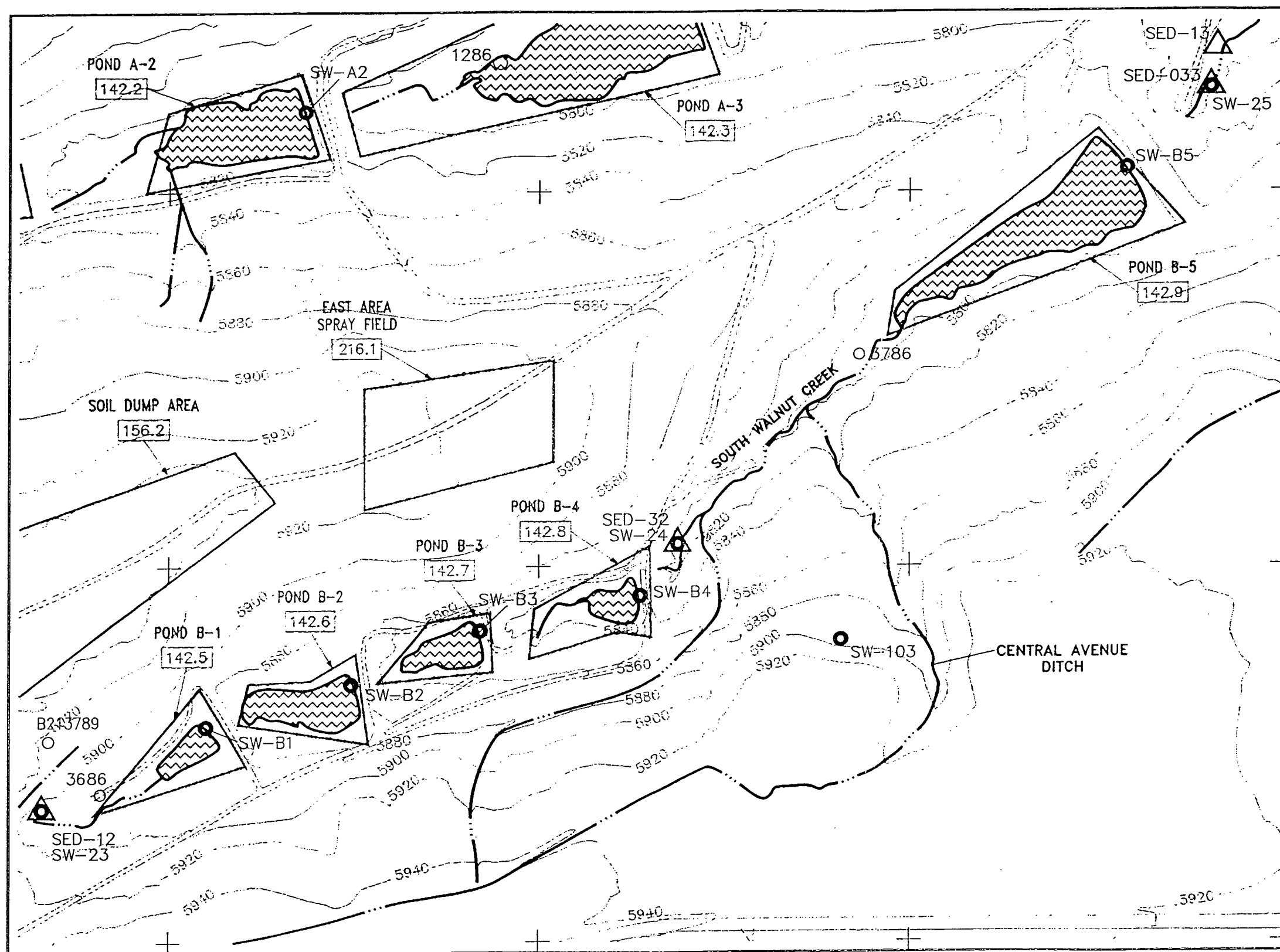
- 115 INDIVIDUAL HAZARDOUS SUBSTANCE SITE
- SW-1 ● EXISTING SURFACE WATER SAMPLING LOCATION
- 5786 ○ EXISTING ALLUVIAL GROUNDWATER MONITORING WELL
- SED-17 △ EXISTING SEDIMENT SAMPLING LOCATION
- 3087 ● EXISTING BEDROCK GROUNDWATER MONITORING WELL
- 0181 △ EXISTING PRE-1986 WELL
- INTERMITTENT STREAM
- DIRT ROAD
- A --- A' CROSS-SECTION A-A', SEE FIGURE 2-7
- A-1 BYPASS (UNDERGROUND PIPE)

U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 6  
PHASE 1 RFI/RI WORK PLAN

IHSSs 142.1-4  
A-SERIES DETENTION PONDS  
(A-1, A-2, A-3, AND A-4)  
ALONG NORTH WALNUT CREEK

FIGURE 2-3  
REV. AUGUST 1991  
APRIL 1991



### EXPLANATION

- 115 INDIVIDUAL HAZARDOUS SUBSTANCE SITE
- SW-1 ● EXISTING SURFACE WATER SAMPLING LOCATION
- 5786 ○ EXISTING ALLUVIAL GROUNDWATER MONITORING WELL
- SED-17 ▲ EXISTING SEDIMENT SAMPLING LOCATION
- INTERMITTENT STREAM
- DIRT ROAD

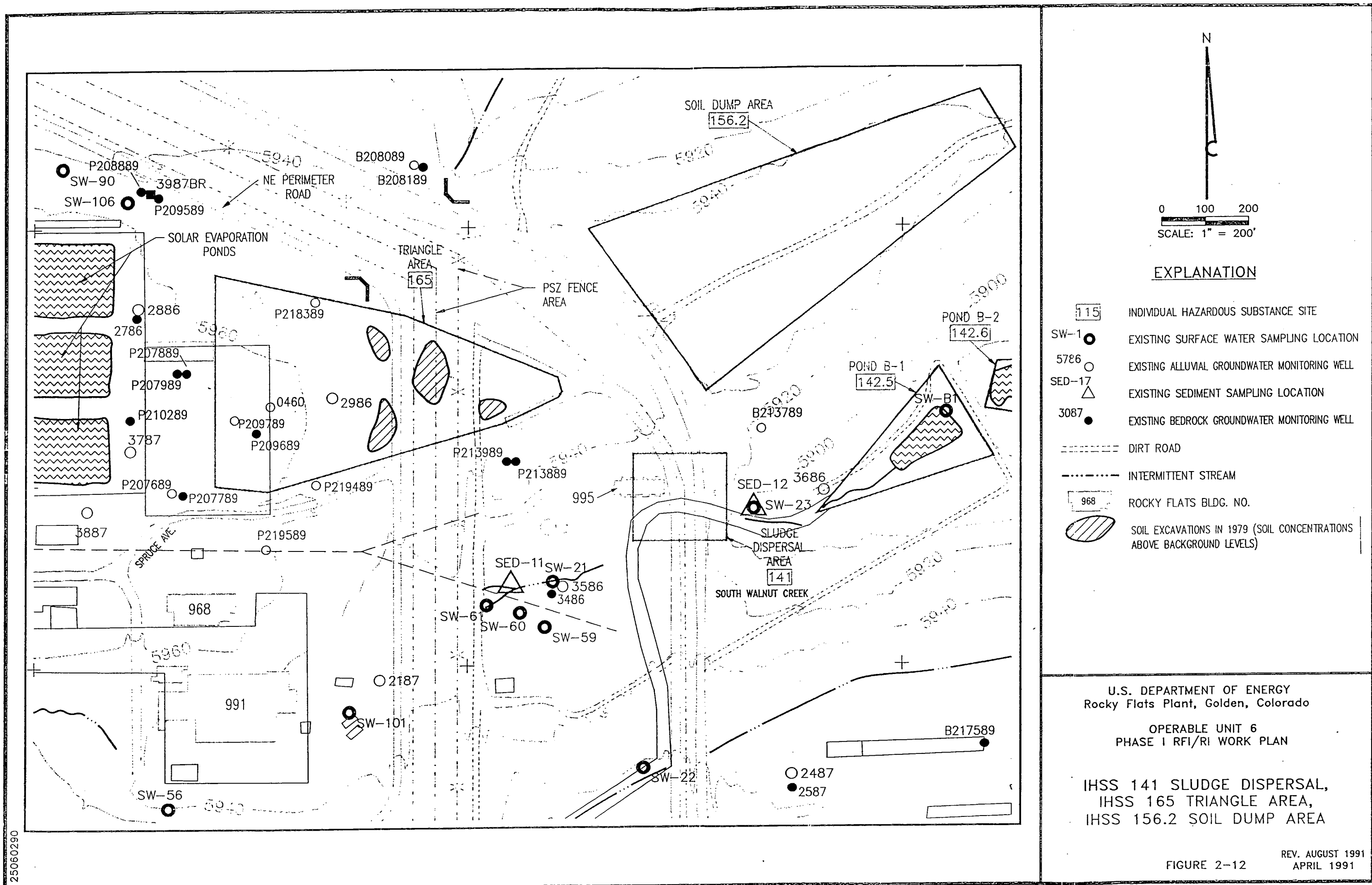
U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 6  
PHASE I RFI/RI WORK PLAN

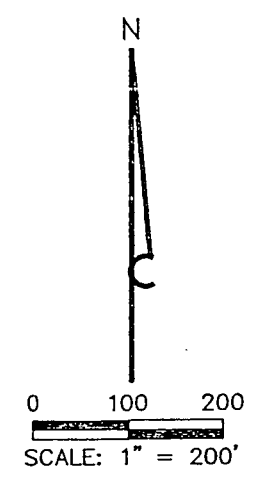
IHSSs 142.5-9,  
B-SERIES DETENTION PONDS  
ALONG SOUTH WALNUT CREEK,  
IHSS 216.1 EAST AREA SPRAY FIELD

FIGURE 2-8

REV. AUGUST 1991  
APRIL 1991



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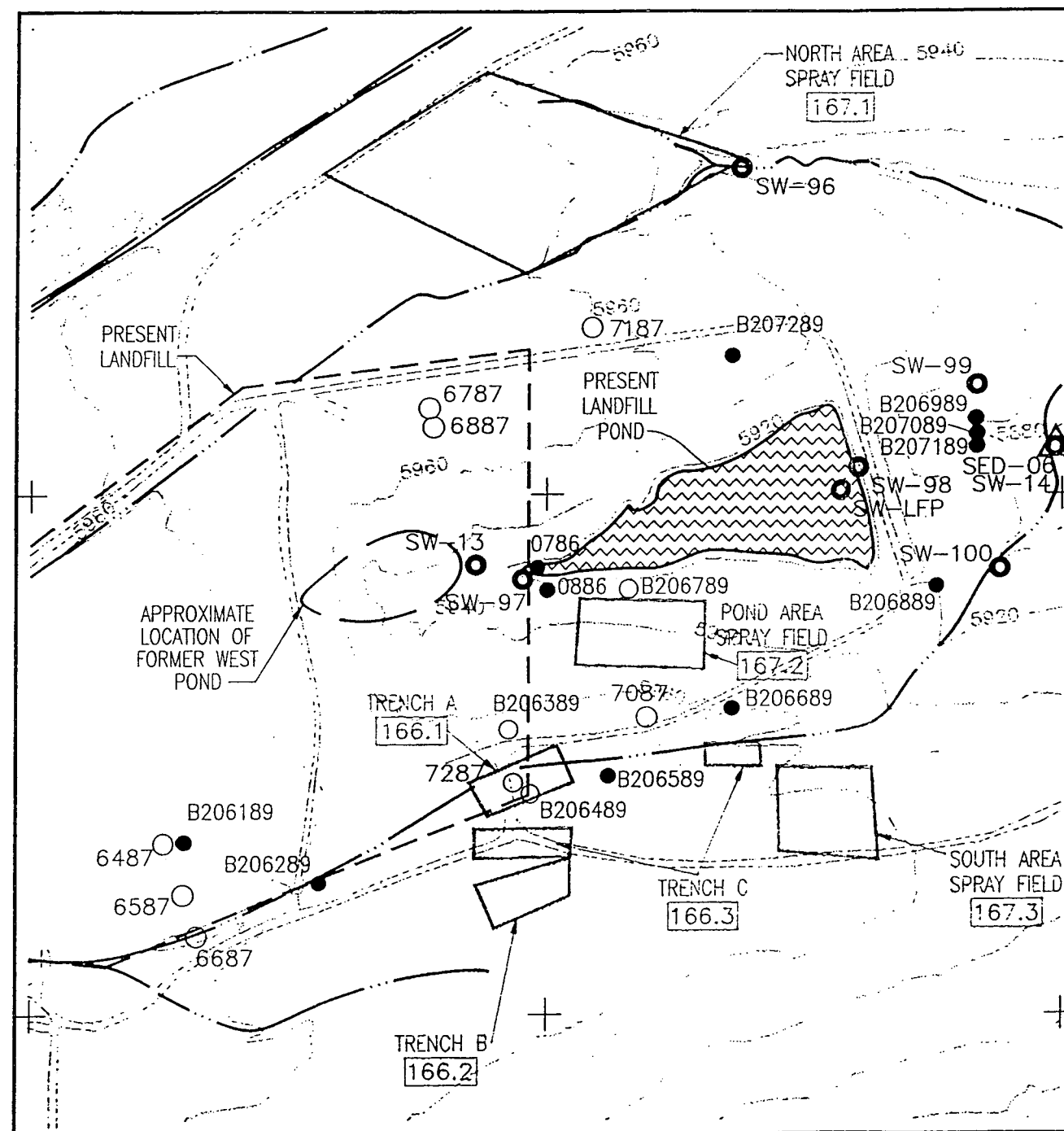
### EXPLANATION

- 115 INDIVIDUAL HAZARDOUS SUBSTANCE SITE
- SW-1 ● EXISTING SURFACE WATER SAMPLING LOCATION
- 5786 ○ EXISTING ALLUVIAL GROUNDWATER MONITORING WELL
- SED-17 △ EXISTING SEDIMENT SAMPLING LOCATION
- 3087 ● EXISTING BEDROCK GROUNDWATER MONITORING WELL
- DIRT ROAD
- - - - - INTERMITTENT STREAM
- 968 ROCKY FLATS BLDG. NO.
- SOIL EXCAVATIONS IN 1979 (SOIL CONCENTRATIONS ABOVE BACKGROUND LEVELS)

U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 6  
PHASE I RFI/RI WORK PLAN

IHSS 141 SLUDGE DISPERSAL,  
IHSS 165 TRIANGLE AREA,  
IHSS 156.2 SOIL DUMP AREA



# EXPLANATION

- 115 INDIVIDUAL HAZARDOUS SUBSTANCE SITE
- SW-1 ● EXISTING SURFACE WATER SAMPLING LOCATION
- 5786 ○ EXISTING ALLUVIAL GROUNDWATER MONITORING WELL
- SED-17 ▲ EXISTING SEDIMENT SAMPLING LOCATION
- 3087 ● EXISTING BEDROCK GROUNDWATER MONITORING WELL
- INTERMITTENT STREAM
- DIRT ROAD

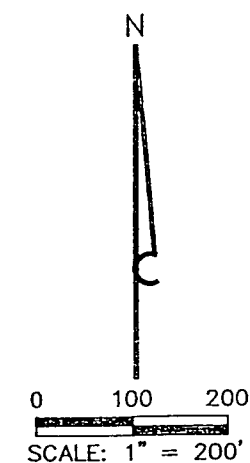
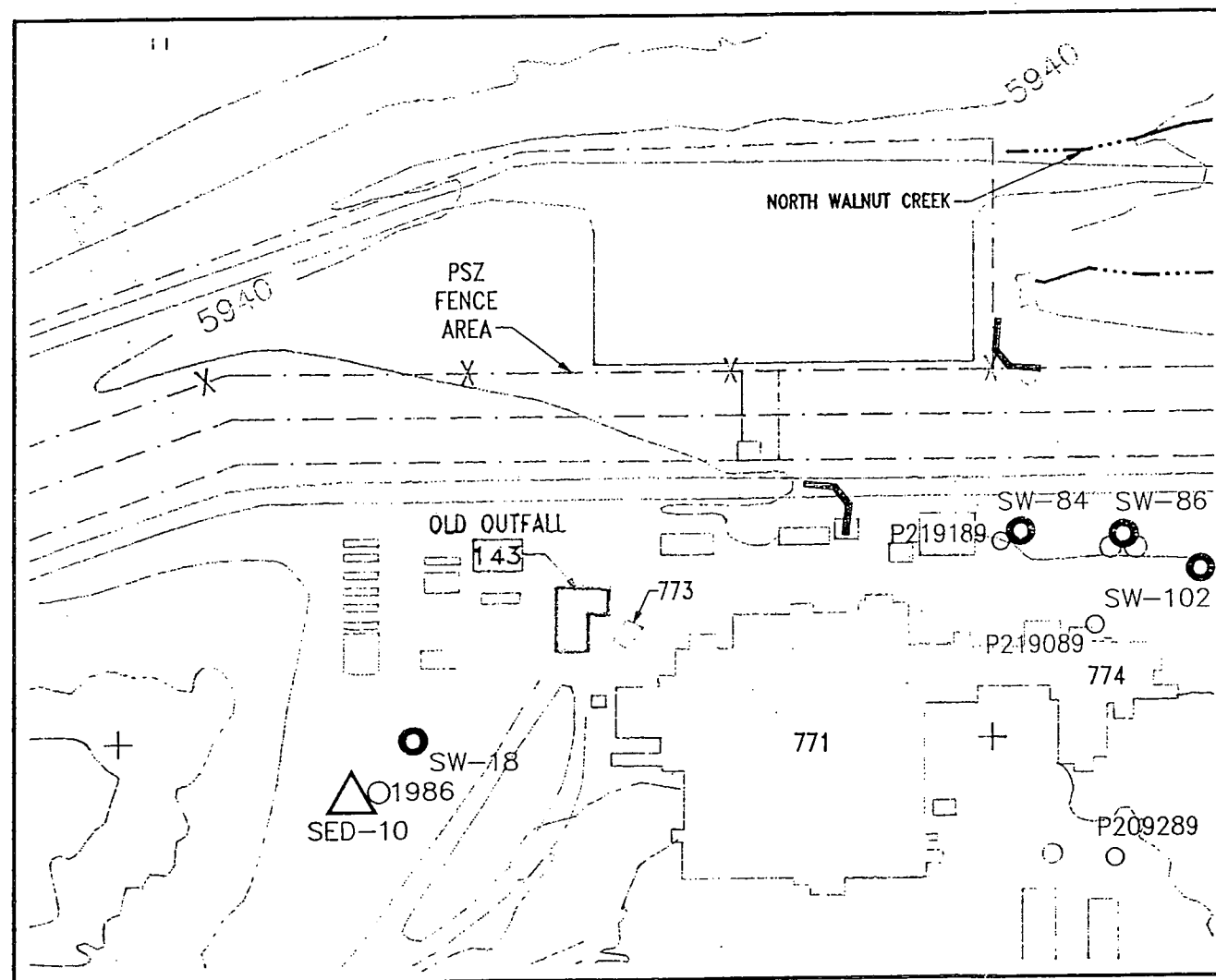
U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 6  
PHASE I RFI/RI WORK PLAN

IHSSs 166.1-3, TRENCHES A, B, & C  
IHSSs 167.1-3 NORTH AREA,  
POND AREA AND SOUTH AREA  
SPRAY FIELDS

FIGURE 2-11

REV. AUGUST 1991  
APRIL 1991



### EXPLANATION

- 115 INDIVIDUAL HAZARDOUS SUBSTANCE SITE
- SW-1 ● EXISTING SURFACE WATER SAMPLING LOCATION
- 5786 ○ EXISTING ALLUVIAL GROUNDWATER MONITORING WELL
- SED-17 △ EXISTING SEDIMENT SAMPLING LOCATION
- INTERMITTENT STREAM
- DIRT ROAD
- 968 ROCKY FLATS BLDG. NO.

U.S. DEPARTMENT OF ENERGY  
Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 6  
PHASE I RFI/RI WORK PLAN

IHSS 143 OLD OUTFALL AREA

FIGURE 2-13

REV. AUGUST 1991  
APRIL 1991